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MACHINE LAPPING EMPLOYED IN REFRIGERATOR MANUFACTURE

By ROGERS A. FISKE

WITH THE ADVENT OF MACHINE LAPPING, A SLOW AND TEDIOUS "ONE AT A TIME" PROCESS HAS BEEN CHANGED INTO A RAPID, "MANY PIECES SIMULTANEOUSLY," COMMERCIAL OPERATION. THE RESULT HAS BEEN THAT APPLICATION OF LAPPING, WITH ITS SEVERAL ADVANTAGES FOR FINISHING THE WORKING SURFACES OF CRITICAL MACHINE PARTS, HAS VERY MUCH INCREASED. USE OF THE PROCESS IN A LARGE PLANT MAKING ELECTRIC REFRIGERATORS AND EMPLOYING A LARGE BATTERY OF LAPPING MACHINES IS OUTLINED IN THIS ARTICLE.

THE Majestic Refrigerator plant of the Grigsby-Grunow Co., Chicago, makes extensive use of machine lapping in the manufacture of mechanical parts for its electric refrigerators. This is a new plant and the machine lapping was put into practice when it was first started. The lapping is done on flat pieces only, the parts having been previously finish ground to close limits for size, parallelism and flatness.

All steel parts to be lapped are first turned or shaped to size and then heat treated to produce a hardness of 60 plus on the Rockwell C scale. They are then ground, from 0.0002 to 0.0004 in. of stock being left for the lapping operation. The parts are then passed to the machine lapping department for finishing; all parts are finished in one operation.

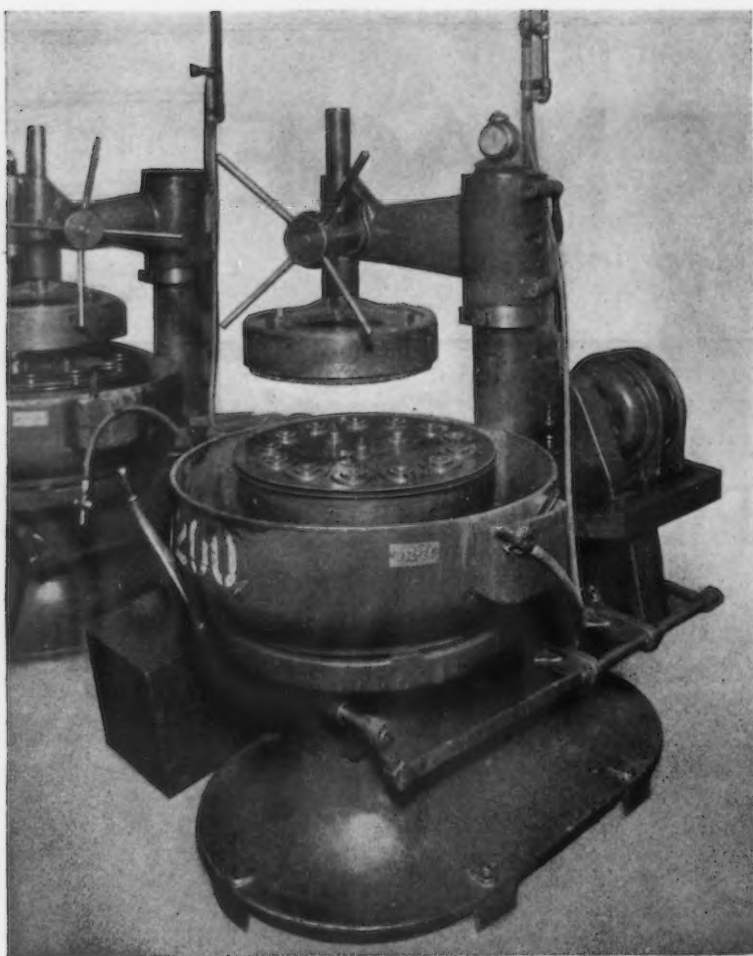
The plant makes use of machine lapping essentially for the finish obtainable, for parallelism of opposite surfaces, and in some cases to obtain extreme accuracy of size. For instance, the exact thickness of a Stellite valve seat is not so important as are finish and parallelism. Another example is af-

forded by the ends of pump bodies, which together with the heads must have such surfaces that the bodies and the heads can be bolted together without a gasket, that is, steel to steel, and at the same time seal the joint effectively against SO₂ gas.

Employs Battery of 27 Lapping Machines

A battery of 27 I-F lapping machines made by the Norton Co., Worcester, Mass., for flat work constitutes the machine equipment. In these machines two cast-iron laps—an upper and a lower—are mounted on vertical spindles and the work is driven in a horizontal plane between them, both laps being in contact with the work.

The lower lap, driven from a mechanism in the machine base, rotates at speeds ranging from 60 to 65 r.p.m. The upper lap, carried in a spindle in the overarm, does not rotate, but is free to float and find its own level when brought into contact with the pieces to be lapped. The entire dead weight of this lap, about 250 lb., is brought to bear on the parts being lapped. The laps are made of a soft



A ROUGH estimate of the metal removed by lapping is had by means of the clock mounted on the machine column. The machines stand back to back with the lapping heads on the aisle and with the motor ends staggered to conserve floor space.

close-grained cast iron and the cutting medium is fine abrasive in kerosene.

The arrangement and the drive of the workholder or carrier of these machines are important elements, since it is through them that the machine simulates mechanically the hand lapping motion of the tool-maker on his flat lap. This workholder may be of a wide variety of designs, including specials with adaptors. Its speed of rotation ranges from 30 to 35 r.p.m. and an important feature is that an eccentric motion is given it, throwing the parts being lapped from the inside to the outside of the laps and thus providing uniform wear of the laps.

These machines stand back to back with the lapping heads on the aisles, and the motor ends are so staggered that a minimum of floor space is required.

The laps are redressed when needed to correct the lap faces, making them true planes and parallel. The redressing is accomplished by first grinding each lap on a Heald surface grinder, and then working a pair of them together on an upright drill press. One lap is fastened on the drill press table and the other rests on it; between the two laps there is abrasive and oil, the lubricant in this case being a 320 compound. By means of a crank in the drill press spindle, the upper lap is made to move in an eccentric path across the lower lap, the upper lap at the same time rotating slowly. During the

process frequent inspection is made with a straight edge that extends across the full diameter of the work.

Pump Bodies Lapped at Rate of 175 an Hour

Applications of machine lapping at the Majestic refrigerator plant include the finishing of Stellite valve seats, which are lapped to within 0.0001 in. for flatness and are required to have a finish that is without scratches. The Stellite is welded into a cold rolled steel ring, seven of which are mounted in a fixture or holder, as illustrated. Thirteen of these holders are mounted in the carrier of a lapping machine.

Another interesting application of machine lapping is on pump bodies made from No. 1020 steel. These are lapped to 0.0002 in. for size and parallelism and the surfaces must be such that the joints between the bodies and the heads are gas tight, without the use of a gasket. It is interesting to note here that the diameter of the pump bodies is approximately the same as the diameter of the holders for smaller parts so that either pump bodies or holders readily fit the carriers on the machine. These pump bodies are lapped at the rate of 175 per hour with one operator attending three machines.

The lapping of ends of rockers that measure $\frac{1}{4}$ in. in diameter by $1\frac{1}{4}$ in. in length is another application at this plant. Sixteen of these rockers are set in a spool fixture and are held in place by a steel band. The lapping machine fixture holds 13 spools. The grinding operations are carried through with 39 spools in a set or three loads for a lapping machine. From 0.0002 to 0.0004 in. lapping stock is left after grinding and the ends are then finished to within 0.0002 in. for size. These rockers are made from drill rods.

Vanes which are cut from square rods, concave on one side, are mounted in fixtures very similar to those used for rockers. They are set at an angle in indentations made in the periphery of the fixture. Twenty vanes are spaced around a fixture and held in place by a steel band. The lapping machine carrier holds 20 of these fixtures. These parts are lapped to a limit of 0.0002 in.

Electric Gages Facilitate Checking Lapped Work

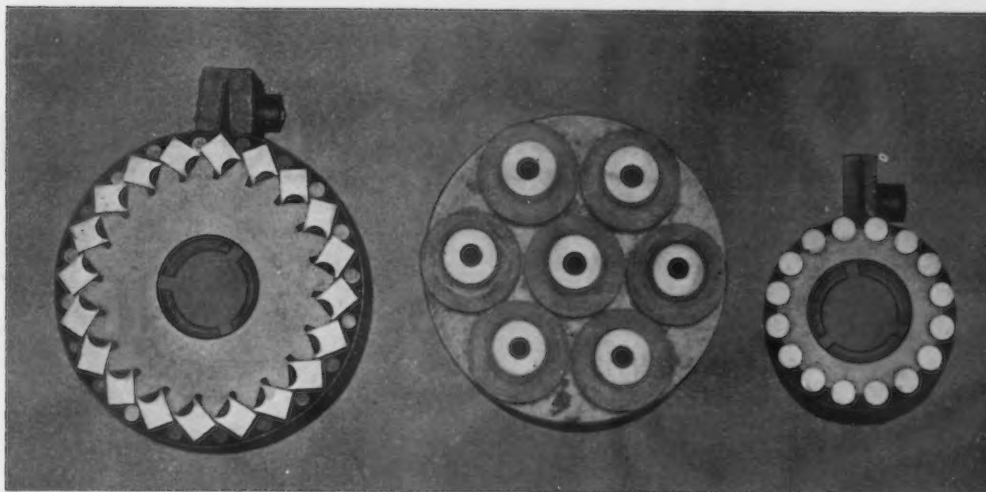
No means has yet been devised whereby a gage can be mounted on these lapping machines and give readings within the accuracy required. On benches adjacent to the machines are electric gages which are vision read by means of flash go-and-no-go signals.

These gages, made by Sheffield Machine & Tool Co., Dayton, Ohio, are capable of checking to better than a ten-thousandth and feature rapid operation, the operator's duties being limited to

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SPECIAL fixtures are made for the various pieces to be lapped. The fixture for the vanes is at the left, that for the Stellite valves is in the center and the spool fixture for the rockers is at the right.

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inserting the work between the anvils and removing it.

If the piece is within the predetermined limits, an amber light flashes; if it is undersize a green light flashes, while if oversize, the flash is red. At intervals during the lapping operation, the fixtures are removed from the machine and gaged. As lapping operations approach the limits required it is necessary for the operator to use caution and to make more or less frequent tests. Mounted on each machine is a clock by means of which some measure of the metal removed can be had because experience has taught that a certain amount of metal will be removed in a given time.

After lapping, small parts are put in a wire basket and dipped in a tank full of Dearborline, made by the Dearborn Chemical Co., Chicago.

Larger parts are run through a Niagara washer. The parts are then sent to the central inspection department where they are checked on electric gages of the same type installed in the lapping department.

Same Gages Used by Central Inspection Department

One advantage of furnishing both these departments with the same type of gages is that in the event of a controversy the heads of both departments will discuss the matter from the same point of view.

The lapping department is in direct charge of a sub-foreman who reports to a general foreman in charge of lapping, surface grinding, bore grinding and outside diameter grinding.



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EACH of the 13 spool fixtures carries 16 rockers, which are lapped to within 0.0002 in. for size.

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CONVEYING EQUIPMENT AND COSTS IN

By F. L. PRENTISS
Cleveland Editor,
The Iron Age

FOUNDRY floor space has been reduced to one-third its former size with no decrease in capacity by the modernization of the Cleveland gray iron foundry of the Westinghouse Electric & Mfg. Co. In addition, various economies have been effected that have resulted in marked reduction in the production cost of castings. Installation of three conveyor lines for continuous molding and pouring and a sand-handling system are the outstanding changes that have been made. Before the recent revamping of this foundry, molds were set and poured on the floor. However, the modern practice of continuous pouring was followed.

This foundry as reequipped is an interesting example of what can be done, without making building alterations, by installing mold and sand conveying equipment in an old building of standard type of steel construction.

The sand-handling and preparation system is on the foundry floor, with flight conveyors for distributing the sand located at low heights so they do not interfere with the operation of an overhead traveling crane over the greater part of the foundry floor. However, the top of the sand storage bin extends above the crane runway, preventing crane travel over a section of the floor. The only under-floor construction



ONE of the conveyors for small molds. Photograph taken from the opposite end shows shakeout grating, molding machines and molders' sand hoppers, and at the right center the inclined belt conveyor that carries the molding sand from the reciprocating belt under the shakeout to the sand preparation equipment above the foundry floor.

REDUCES FLOOR SPACE OLD PLANT



REDUCTION of floor space to one-third its former size and a marked lowering of production costs are results of modernizing an old foundry, as described in this article. The principal changes were the installation of three conveyor lines for continuous molding and pouring, and a sand handling system. The equipment was put in without making building alterations.

required because of the absence of a basement beneath the building was the construction of a tunnel for a conveyor to handle the sand from the shakeout gratings. This necessitated the tearing up of the floor only above where the tunnel was to be located.

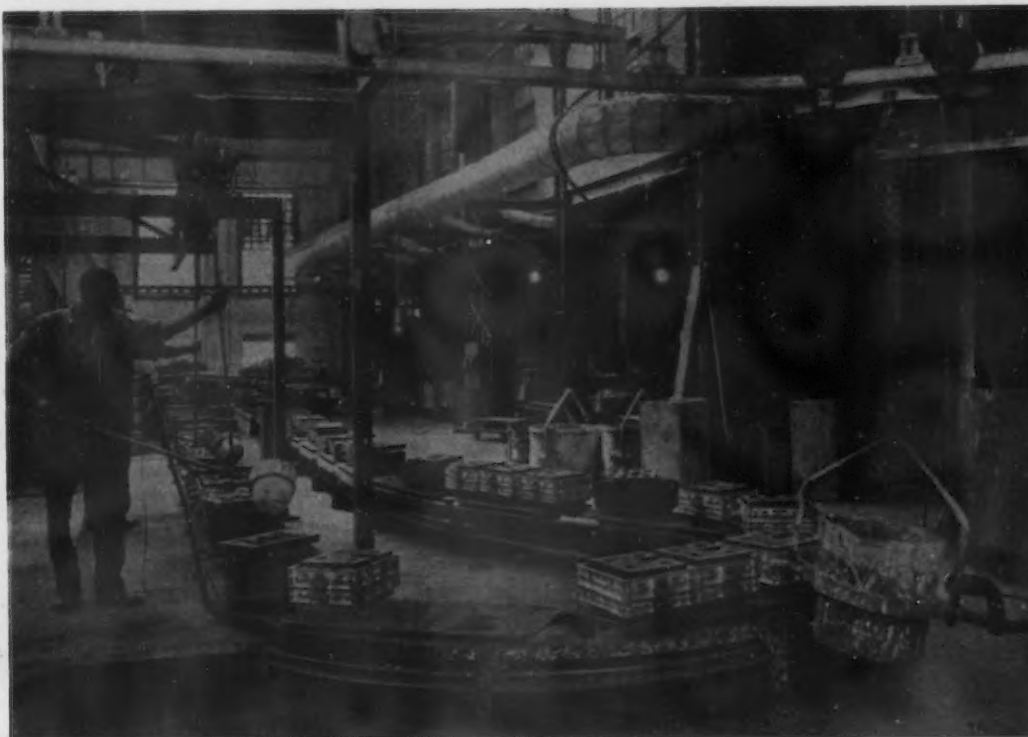
Modernization of this foundry and an increase in its efficiency was part of the company's program in shifting the manufacture of castings used in its numerous products. Motor brackets and miscellaneous castings formerly were made in this plant, but the

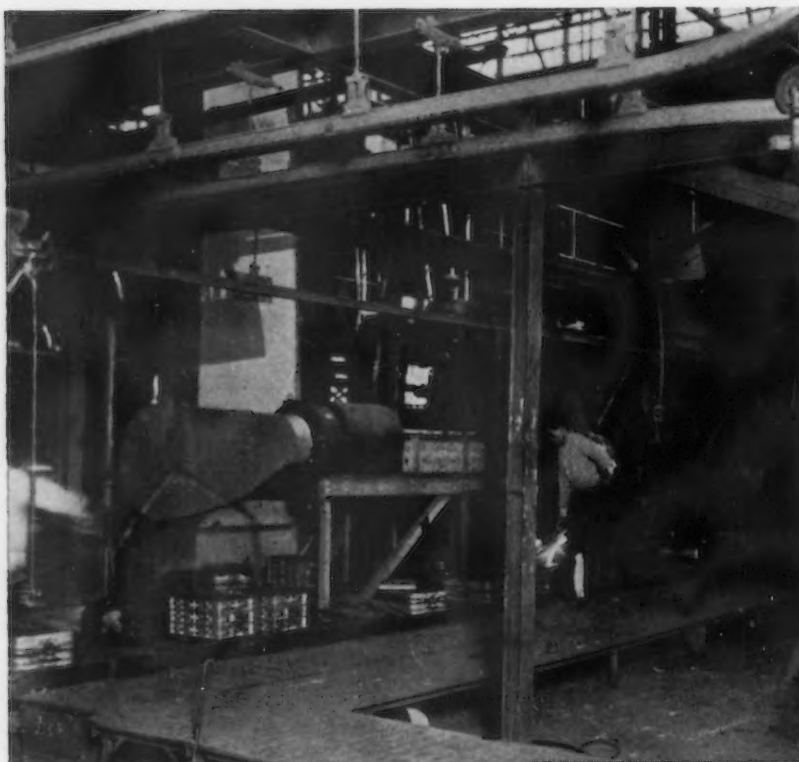
manufacture of these was transferred to the company's Trafford City foundry. The Cleveland foundry now is used for making a smaller class of castings, the average weight being 5 to 6 lb., although the output includes street lamp posts weighing up to 750 lb. or more. Included in the production are all castings, such as brackets, arms and supports for ornamental lighting fixtures, castings for electric ranges, electric irons and for industrial electric furnaces, for its Mansfield, Ohio, plant, miscellaneous meter castings for its

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CONTINUOUS mold conveyor of the car type for handling small molds, with the pouring platform at left. Floor space is conserved by having the two sides of the conveyor on only 5 ft. centers, which also makes it convenient for shifting weights from molds on the cooling side to those on the pouring side.

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TRAVELING pouring platform and pouring zone for one of the conveyors for small molds. Back of the mold conveyor is the pug mill, for mixing the sand, and the sand elevator.

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 them to make the turn at the end of the conveyor line. Equipped with variable-speed transmission, the conveyor has a speed range of 8 to 16 ft. a minute, but is usually operated at 14 ft. a minute. One of these conveyors has a moving pouring platform that travels at the same speed as the conveyor and the other a stationary platform, both being of the same height as the conveyor. There is also a short pouring platform located inside the conveyor loop opposite the stationary platform so that, in case a flask should not be poured as it moves along the regular pouring platform, it may be poured on the opposite side of the line after passing around the loop end. These conveyors were built

Newark, N. J., plant, and grid resistors for its East Pittsburgh plant.

Two Continuous Mold Conveyors

The conveyor system in the rearranged foundry occupies a floor space of 96 x 108 ft. With its three molding and pouring units it has a capacity of 500 tons per month based on an 8¾-hr. day and a five-day week. The continuous mold conveyors are located side by side. Two that are used for the smaller work are duplicate units. These are approximately 200 ft. long and are of the car type. The two sides of the conveyor are parallel except near the ends, where one side loops out to provide a 5-ft. turning radius. The distance between the two conveyor tracks is only 5 ft. center to center. The narrow space between the molding and pouring side of the conveyor and the opposite cooling side not only saves floor space, but makes it convenient to shift weights from molds on the cooling side to new molds on the opposite side, this being done near the center of the conveyor.

The conveyor consists of 43 four-wheel flat top cars 48 in. long and 20 in. wide, set about 8 in. apart, being separated a sufficient distance to allow

by the Jeffrey Mfg. Co.

Molds are made in snap flasks and small steel and aluminum closed flasks. Metal slip-over boxes are placed over the snap flask molds before pouring when found desirable for certain molds. Molds poured on these conveyors are made on Osborn squeezer-type



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THIS shows the circular sand storage bin, table feeder, final tempering belt and rectangular shaped mold conveyor.

molding machines. There are 14 of these machines, seven for each conveyor arranged in two adjoining rows, the rows being on 10-ft. centers.

Molding sand for these two lines of machines is supplied by one flight conveyor that serves two rows of sand hoppers which extend down from beneath the flight conveyor at a sufficient angle from the perpendicular to bring the discharge ends above the two lines of molding machines. The flasks are shaken out over a grating at the end of each conveyor and the flasks and bottom boards are returned on the conveyor to the molding machines.

Intermittent Mold Conveyor

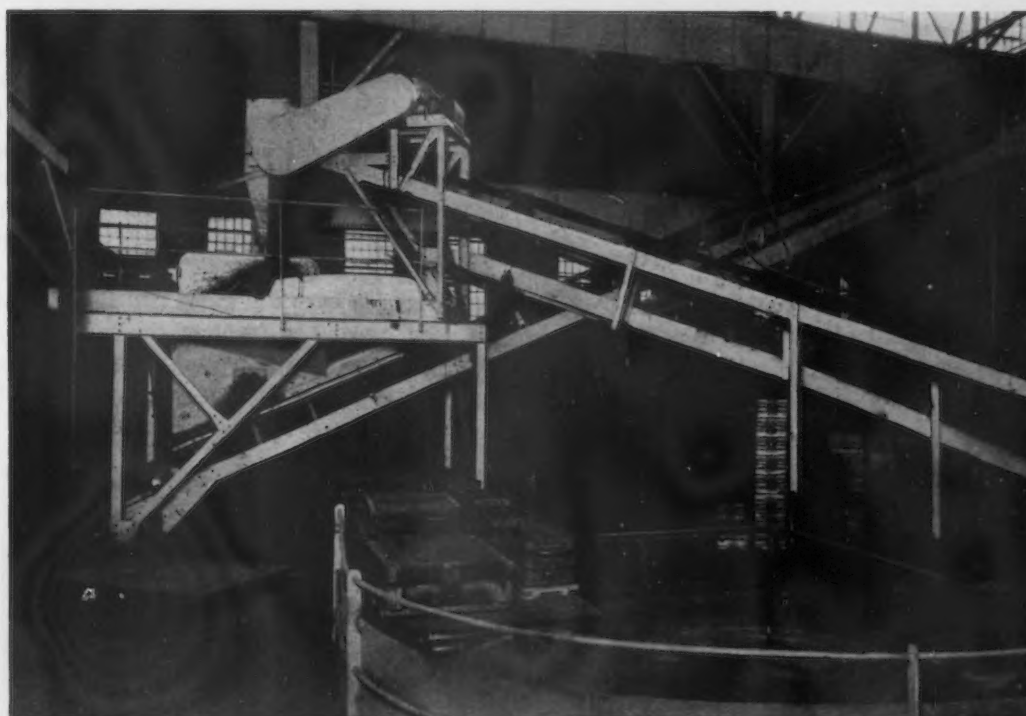
The third molding conveyor, which is used for larger work, is 210 ft. long and built in rectangular

made on six Osborn machines arranged in pairs on each side of the conveyor. A pair consists of a jolt roll-over machine for the drag half of the mold and a jolt squeezer for the cope. Most of the molds are made in closed metal flasks. Molds are poured from both sides of the conveyor from two stationary platforms along the pouring zone. There are five shakeout gratings at the shakeout end of the conveyor line and on the same level as the conveyor. A roller top car moved by hand on a 2-ft. track between the conveyor and shakeout obviates the necessity of lifting the flask. The shakeout men shove the car to a point opposite the flask, pull the latter across the top of the car and tip it over the shakeout. Space inside the rectangular conveyor is utilized for storage of flasks and bottom boards.

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FINAL tempering belt conveyor, re-vivifier and cross belt conveyor. In the foreground is an idler corner of the rectangular shaped mold conveyor.

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form. This is a plate-type anti-friction conveyor, being constructed on 35 6-ft. x 36-in. plates, on the under side of which are rails which run on rollers beneath. This conveyor is operated intermittently to make pouring easier and provide longer cooling time. In operation it is divided into seven groups of five plates each. While one group is at the molding station the second group is at the pouring station, four are in the cooling section and the seventh is at the shakeout.

This conveyor moves 30 ft. at a predetermined speed automatically controlled, then stops 4½ min., during which time the molds are made, poured and shaken out. The time of travel between stations is ½ min., making a 5-min. cycle, which may be varied from 4 to 7 min. However, there is no change in the ½-min. time the conveyor is in motion. This conveyor was supplied by the Link-Belt Co. This company also installed the sand handling and preparation system.

Molds handled on the intermittent conveyor are

Iron from each of the two cupolas is poured into a 2500-lb. tilting ladle that is set in front of the cupola and from these ladles it is poured into 250-lb. bull ladles that are carried on Cleveland hand-operated monorails to the pouring stations where the metal is transferred to hand ladles from which all molds are poured. The cupolas have 72-in. and 78-in. shells lined down to 48 in. These are operated on alternate days.

Reciprocating Sand Conveyor

The sand handling and preparation system, which has a capacity of 30 tons an hour, has several interesting features. The seven shakeout grates for the three molding units are in straight line near the side of the foundry, and beneath these under the floor is a reciprocating conveyor which carries the sand from the five shakeouts on the one side and the two on the other to the center of the conveyor. The movement of the conveyor in one direction carries the sand from one end to the point of discharge, and its reverse movement brings sand from the opposite end to the same point.

The sand passes from the reciprocating conveyor to a belt that runs up through the foundry floor at an incline of about 30 deg. and on this it is elevated to a hexagonal-shaped tapered screen. A magnetic pulley on the belt removes pieces of metal. Passing through the screen the sand drops on to another belt conveyor which carries it to a twin-paddle pug mill, water being added before it reaches the mill. After mixing in the pug mill, it passes into the boot of an elevator which carries it up a cross belt that feeds into a 150-ton circular storage tank. From the bottom of this tank it passes over a circular feeder on to a belt that carries it to a Rapp revivifier for final tempering. From this the sand falls on to a cross delivery belt which feeds the three flight conveyors, one serving the two smaller molding units and the other two over the two rows of molding machines that operate with the third mold conveyor. These flight conveyors deliver the sand to the molders' hoppers.

Sand that overflows from the ends of each flight conveyor passes into a discharge pipe which carries it back to the shakeout conveyor. Excess sand is run through the system both to make sure that there is always enough sand to fill all the hoppers and in order to put some tempered sand back into the shakeout and assure greater uniformity in moisture in the sand coming back into the mixer.

Used sand sometimes is hot and dry and contains less moisture than at other times. The prepared sand that goes through the system and is added to the used sand amounts to about 10 per cent of the total. By

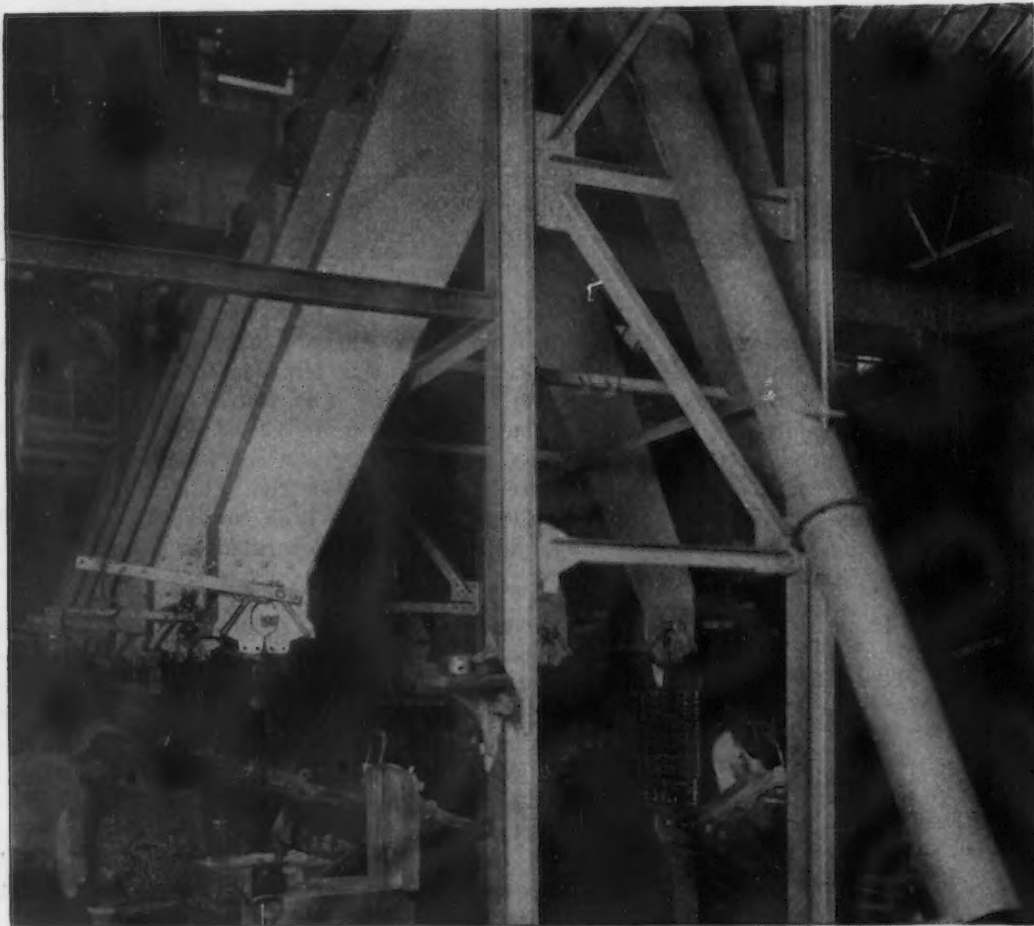
adding prepared sand to the used material, the foundry is able to hold the sand as it reaches the mixer to a moisture variation of 6 to 7 per cent.

Water Added to Sand at Two Points

One practice in sand preparation that is not generally followed is that water is added to the sand at two points, first before entering the mixer and again at the discharge end of the storage tank. As it is not desirable to store tempered sand in too wet a condition and it is a simple matter to add water if the sand comes out of the storage tank too dry, it goes to the storage tank in a rather dry condition and the additional moisture needed is added when it leaves the storage tank.

With a very wide variety of work, considerable attention has been given to provide a molding sand that can be used for all classes of castings. Close-grained sand with a fairly high natural bond is used and occasionally coarse sand is added to increase the permeability. The foundry tries to hold its sand to the A.F.A. permeability range of 20 to 25.

An electrically operated monorail is located back of the shakeout, and this carries castings to the cleaning department in buckets in which they are placed after being shaken out. Grid resistors go from the shakeout on to a roller conveyor about 40 ft. long to a table where the gates are removed. Then they are piled in bins in front of the sandblast. Leaving the sandblast they are placed in boxes and move on another sec-



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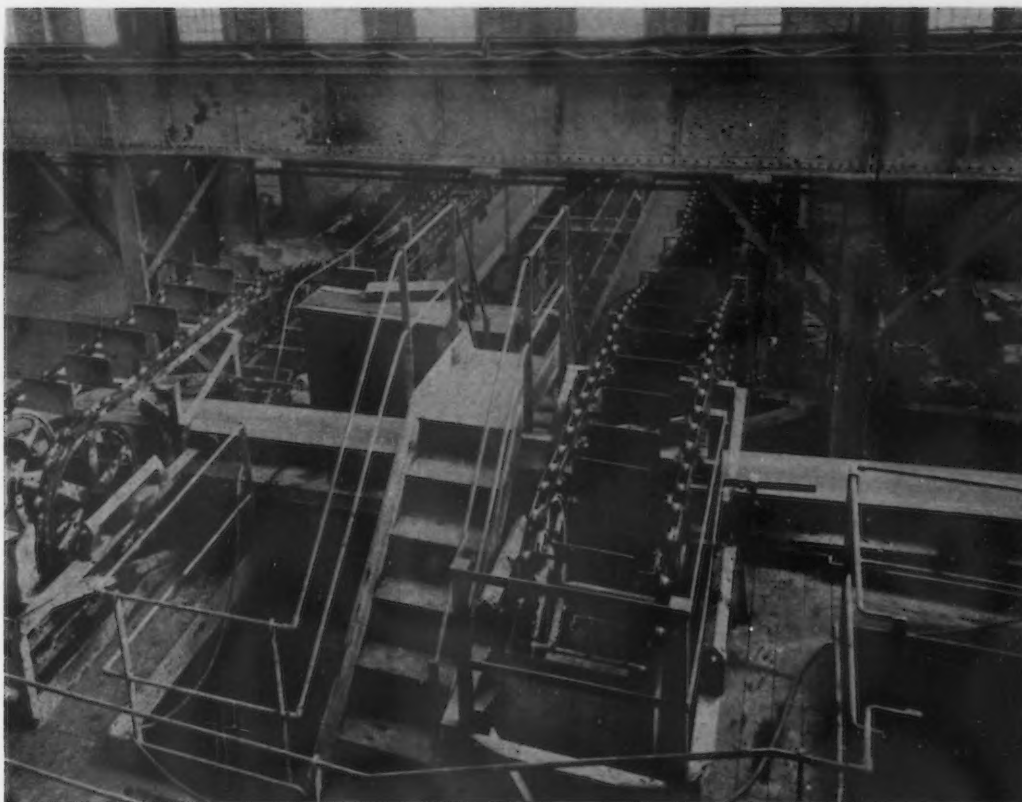
PREPARED sand hoppers over squeezer molding machines, the two rows of hoppers being served by one flight conveyor. The pipe in the foreground carries the overflow sand from the flight conveyor.

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TWO of the distributing flight conveyors which deliver the sand to the molders' hoppers.

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tion of roller conveyor to the grinding and chipping. With its present layout the foundry is able to attain high production of small parts. Seven molders are able to make 245 resistor grid molds an hour, 35

an hour for each man. In filling a recent order for 50,000 brackets for small motors the foundry turned these out at the rate of 240 molds or 480 castings an hour, two patterns being put in each mold.

Vanadium Can Delay the Quench Hardening of Steel

RESULTS of a systematic investigation of the physical properties of iron-carbon-vanadium alloys varying in composition from 0.10 to 3.0 per cent carbon, and 0.40 to 16.0 per cent vanadium have been reported by H. Hougardy (*Stahl und Eisen*, May 7, 1931). In binary iron-vanadium alloys the effect of vanadium is to pinch out the stability field of gamma iron, 1.1 per cent V being sufficient to eliminate the gamma field. The marked affinity of vanadium for carbon to form the carbide V_4C_3 (1 per cent V unites with 0.175 per cent C) increases the amount of vanadium required to produce this effect.

As the vanadium content of a carbon steel is increased, more and more iron carbide is converted to V_4C_3 until, when the proportions are V:C as 1:0.175, no more iron carbide remains and the A_1 transition disappears. With further increase in the vanadium content, the A_1 point is raised and the A_1 temperature is lowered, until when the percentage of vanadium is equal to $1.1 + C$ per cent of 0.175, the gamma iron region pinches out of the phase diagram. Vanadium carbide does not occur in pearlite because it forms no double carbide with iron carbide, although there may be a partial solid solubility of the two carbides. Vanadium carbide is not soluble in alpha or delta iron, but appears to dissolve slowly in gamma iron with increasing temperature.

The physical properties of the alloys are explicable

in terms of the occurrence of the two carbides; the transformations between iron and carbon occur only when the vanadium is not sufficient to unite with all the carbon.

Above a certain vanadium content, depending on the amount of carbon, the hardening on quenching is delayed so that finally the steel cannot be hardened even by the most drastic quench. These steels exhibit a bright, coarsely crystalline fracture which is unaffected by heat treatment. The delaying effect of vanadium raises the temperature required for quenching to give surface hardness and at the same time appears to lower that required for internal hardness so that it sometimes happens that superficial hardening cannot be accomplished without hardening the interior.

As long as Fe_3C or pearlite is present, the A_1 transformation occurs, but the presence of vanadium independent of the amount raises the temperature of the change about 18 deg. F. Vanadium tends to shift the gamma iron region of the diagram toward the high-carbon side without changing its area but leaves a field at the iron-rich side in which gamma iron does not form. In this field occur the steels which show no transition, do not harden and have a coarse grain.

Excepting the vanadium carbide, no new structural components were discovered in the investigation of the ternary system to 3.4 per cent C and 5.6 per cent V.

WHY PAY A PUNCTUALITY



A PUNCTUALITY bonus is a management subject that deserves and requires the most serious thought. Payment of a bonus for starting one's daily work on time is fundamentally wrong. Its introduction into any industry or business should be avoided.

Where such an incentive plan has been installed, however, a discontinuance of its use may prove more detrimental than to keep it, for the reason that employees as a class object to changes and are invariably skeptical as to the motive which prompts the change. Any so-called scheme for any purpose, therefore, should always be considered thoroughly before adoption.

We have heard much about a troubled industrial relationship and a new era for industrial relations. American industrial relations are on a higher plane today than ever before in the history of capital and labor. The relationship between employer and employee is no longer one of discord and strife, each insisting on and fighting for his particular rights, but is a relationship which may be characterized as a co-operative and mutual one. The success of one is the success of the other; the failure of one is the failure of the other; and the interest of one is the interest of the other.

Contract Presupposes Punctuality

Why, then, a punctuality bonus? The sanctity of a contract, be it oral or written, expressed or implied, must always be maintained. This is a cardinal principle of the law of contractual relations, and judicial decisions follow this basic rule. Every person employed in this country, in the absence of an expressed oral or written agreement, contracts impliedly to observe the hours of labor, rules and regulations of his employer, and to perform satisfactorily the duties assigned him.

In consideration of this the employer agrees to pay for services rendered a wage agreed upon at the time of hiring, or an amount equal to the wage paid others by him for similar services. From the hour the employee is required to begin work until the hour set for quitting, exclusive of the luncheon period, is the employer's time, during which he pays for services performed.

Any additional payment made for this period constitutes an over-payment not involving a new obligation. In the case of piece work, task and bonus systems additional payment is made for increased production, but the initial rate is set and must be met to receive the regular wage.

In the case of a punctuality bonus the employer is paying an additional wage for something the employee is obligated to do without extra compensation. For an employer to pay his employee a bonus for being on time would be analogous to an employee paying his employer a bonus for receiving his wages on the day set for payment. The obligations are not dissimilar, for each is merely doing what is expected of him, in accordance with the terms of the implied contract.

Why Not a Penalty for Tardiness?

Tardiness, like absence, affects production. If indulged in habitually it proves serious to both the work and the morale of any organization. In lieu of paying a bonus for punctuality a penalty should be exacted for tardiness. If an employee knows that he must begin his work on time and failure to do so means a forfeiture, fewer persons will be late.

On the other hand, if an employee knows that he is not required to arrive on time, but will be paid a bonus if he does, the average person is likely to sacrifice the incentive and yield to the greatest of all

BONUS?

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By A. H. RODRICK,
Industrial engineer, Washington
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PUNCTUALITY is required or assumed in the contract of employment—oral or written. Mr. Rodrick argues for a penalty to discourage both tardiness and unauthorized absences. He further recommends making the employee feel how he is contributing, in punctuality, to the success of the business as a whole.

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temptations—a few additional minutes of sleep in the morning. Crimes are punished not so much because the State must be avenged for the wrong done as to deter wrong-doing. A penalty for tardiness is therefore a corollary, since tardiness can best be reduced by example.

One employer, with whom the writer has had experience, employing thousands of workers in scattered factories, has always caused a tardy employee to lose one hour's pay. Tardiness in these shops has been kept at a minimum.

Planning the Next Day's Work

The efficient foreman plans his daily work a day ahead, and a tardy employee is often responsible for upsetting a whole planning schedule. Both tardiness and absence may be divided into three kinds: unavoidable, authorized, and unauthorized. In the first class fall such cases as cannot be foreseen or anticipated from day to day. The second class comprises those cases concerning which the employer is informed, the day before. The third class constitutes those cases which are inexcusable. The second class affects production and advance planning the least.

A regulation of every well-governed organization should be that employees be required to report, by telephone or otherwise, to the shop foreman or centralized office every emergency or unavoidable absence or tardiness. Violation of such a regulation without justifiable excuse should always be the cause for disciplinary action; and a continued abuse, under conditions which warrant it, should result in discharge. The same disciplinary measures should apply to unauthorized absence and tardiness.

Punctuality is a virtue in all things, and most men, like children, have to be taught the value of the principle. In industry and business this virtue is an important element of successful management. To in-

terest employees in their work by making them feel that they are contributing to the success of business is what industry needs. Wherever this has been accomplished employees do not have to be paid extra to be on time. It has been well said that a little more industry wouldn't hurt industry.

New Protective Coatings for Steel Pipe

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TWO procedures for protecting steel pipe from corrosion have recently been developed at the Mannesmann works at Düsseldorf, according to Deutsche Bergwerks-Zeitung. "Tornesit" is a rubber derivative which may be dissolved in suitable vehicles and applied as a thick or thin paint on the cold metal. "Herolith" is a product of the synthetic resin industry which is applied in the liquid state to the object by a special process followed by drying in ovens. The strength in each case is about that of a coat of strong paint. The hardness increases in time and the coatings are not softened by heat or other influences. Tornesit is generally gray, Herolith is brown.

Both materials adhere very firmly to the metal surface. They remain elastic and are not loosened in bending the protected pipe. Neither is affected by cold or by dry heat at 275 to 400 deg. F. When dry, Tornesit and Herolith are odorless and tasteless and do not affect the flavor of drinking water. Both offer protection from stray electric currents.

The Mannesmann research department has tested the resistance of the coatings to many chemicals. Of all the materials tested which are apt to be transported in pipes, Tornesit was attacked principally by hydrogen sulfide, tetralin, and bentol in the liquid form. Herolith was only affected by alkalies. Even sulfuric and nitric acids did not attack these coatings.

CABLE REELS A GROWING OUTLET

LABORATORY and field tests of all-steel cable construction with a steel drum. Design of reels have proved their economic advantages over the all-wood reel and the wooden steel reels and development of shop practice for their manufacture have been brought to a high degree of perfection by the R. B. Hayward Co., Chicago, which produces and sells steel reels under license arrangement with Electric Research Products, Inc., a subsidiary of Western Electric Co.

The Western Electric Co. now has more than 50,000 steel reel drums in use. There have been no drum failures, though the first 300 drums were put in service in June, 1926.

Advantages of the steel reel are: They cannot rot, there is no renailing damage, rough edges which damage cable sheaths cannot develop with hard usage, repair cost is extremely low and they are exceptionally strong as to torsion, impact and crushing strains. Their range of usefulness is probably best illustrated by the fact that they are made in head diameters ranging from 24 in. to 108 in. and in outside widths from 15 in. to 53½ in.

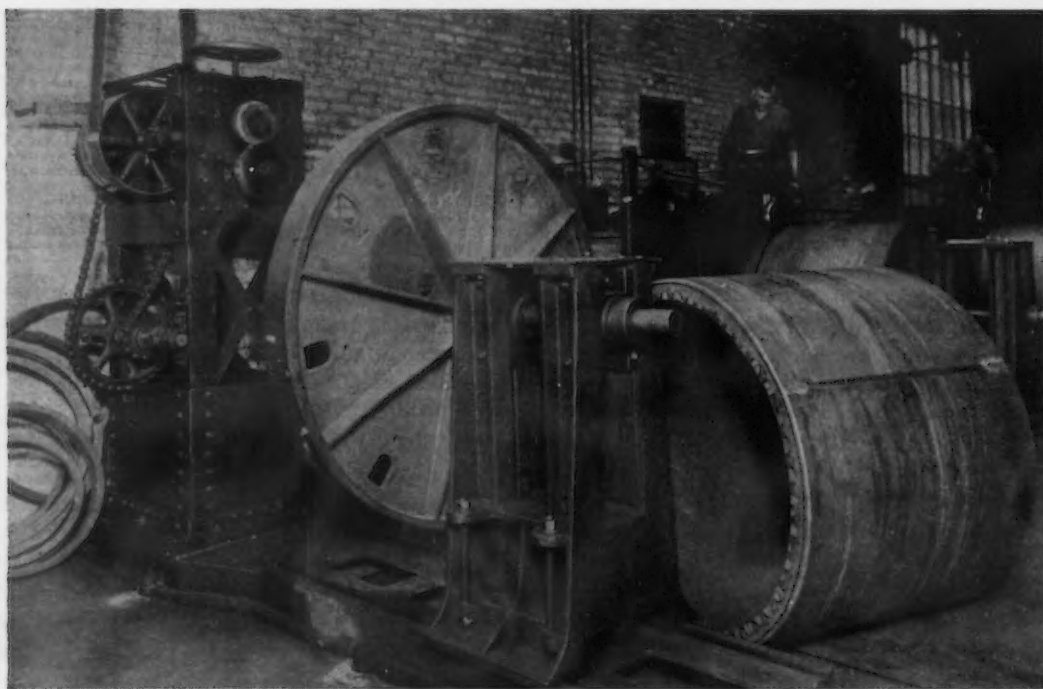
Drums Are Made from Sheets

Shop practices center in special equipment for flanging and forming and electric arc welding. Bar-

rels for steel reels are made in diameters that range from 6 in. to 60 in. of either galvanized or blue annealed sheets in gages that range from No. 16 to No. 10. The drum is formed on standard bending rolls and the longitudinal seam is closed on a semi-automatic electric welder.

This shell is then flanged by slipping one end over a mandrel to which it is clamped after having been fitted to a gage for proper width of flange. The flange is rolled or spun down by driven rolls which rotate the shell. The mandrel on this machine is moved backward and forward on ways. After both flanges are formed, the drum is removed to a punch press, where the rims are punched for through bolts, which, in the scheme of assembling a reel, pass through the opposite side sheets and the drum flanges. These flange holes are punched oversize and flanged to take a pipe ferrule, which is welded to an angle chip, which in turn is welded to a spoke on the head. The standard design is to have one through bolt for each spoke.

Heads are fabricated from side sheets 24 in. to 108 in. in diameter and in thicknesses that range from No. 16 gage sheets to 3/16-in. plates. The outer edge is swedged to an offset so that the rim channel fits over the side sheet to which it is electrically welded. This construction gives a smooth inside



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SHELLS, after having been welded, are mounted on the mandrel of this machine and the flanges are rolled or spun down.
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FOR STEEL

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ANOTHER example of the substitution of steel for wood is in reels for cables. Although steel reels were first put into service only five years ago, more than 50,000 have now been manufactured. The production process makes use of electric arc welding for the assembly. Drums and heads for the reels are made from sheet steel and the reel ring is composed of channel sections.

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STEEL reels are made in diameters up to 108 in. Over 50,000 are in use and there have been no failures in service.

surface. The rim channel is formed on a press brake, rolled to a circle and closed by electrically welding the seam.

The spokes are formed channel sections. Formed gussets extend between spokes at the rim. Assembling operations are performed on cast iron, manually rotated tables that are 108 in. in diameter. Table surfaces are machined and gage holes are spotted to facilitate the assembly of various sizes of reel heads.

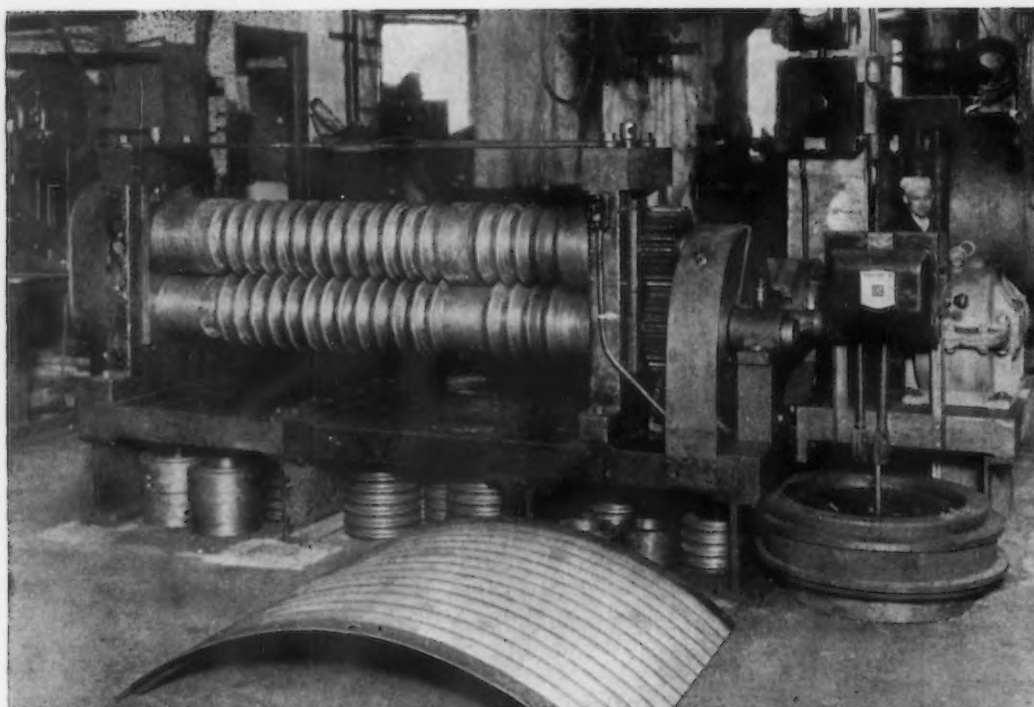
The reel ring is first centered on a table and then gage holes are marked for the number of spokes required. The spokes are laid in place and clamped, after which the gussets are located in place. This skeleton is then welded and transferred to another table, where the skeleton of spokes and gussets with center ring in place is welded to a side plate. The work is then moved to another table, where the rim channel is welded in place by an automatic machine

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RIM channels are welded in place by a two-arc automatic machine.

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SPLIT collars permit adjustment of these rolls so that lagging of various widths can be shaped.
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which has two arcs spaced 180 deg. apart. The seam is closed on the side where the rim joins the side plate while the motor-driven table makes one-half a revolution. The head is then turned over and the rim channel is automatically welded to the gussets and spoke ends.

Steel guides are welded inside the gussets to facilitate the insertion of the bolts which hold the lagging in place, and to provide added strength to the gussets in resisting radial and lateral loads. These bolts are the stephead carriage type and fit into square holes in the lagging and outer edge of the rim channel. Case-hardened wing nuts are made with projections on the bearing surface. Slight indentations are pressed in the gussets when the bolt holes are punched so that when the nut is tightened it locks in place.

Covers, or lagging, are made of corrugated steel sections for serviceability and convenience in handling. Each section extends over the distance gaged by two spokes with ample overlap to make a continuous cover.

Corrugations are formed lengthwise of the diameter of the reel. Each sheet is cut and trimmed to size and rectangular slots are punched for the lagging bolts. The sheet is then corrugated in a standard 300-ton press fitted with dies so that one corrugation is made with each stroke of the press. Fitted to the back of the press is a notched gage bar so that the operator moves the sheet back one notch on the bar after each stroke of the press. This method of corrugating is used because it affords the degree of accuracy needed when using sheets in gages from No. 16 to No. 10.

The corrugated sheet is flat as it comes from the press. It is then necessary to form it in an arc so it will have the proper contour to fit the rim of the reel. This operation is performed on corrugated rolls. The two outer edges of the lagging are flat so they will form a close fit on the outer surface of

the channel rim. Therefore, the corrugated rolls are adjustable, and split collars can be moved to make the rolls adaptable for various widths of lagging.

▲ ▲ ▲ Heskamp Process for Utilizing Blast Furnace Dust

THE results of four years' experience in the application of the Heskamp process for handling blast furnace dust are discussed by R. Mildner (*Stahl und Eisen*, Sept. 10, 1931). The dust discharged from the mouth of the furnace is caught in a collecting chamber from which it passes over screens. The coarse particles are recharged in the ordinary manner, but the fines are conveyed to drums where a blast of blast furnace gas at 4 to 6 atmospheres from two-stage rotary compressors stirs up the dust and blows it back into the furnace stack through special nozzles. The height of these nozzles in the stack is of great importance, for if they are too high the charge above will not filter out the dust blown in, and if too low the high temperature will result in undue wear on the nozzles. A blast of 83,000 cu. ft. per hour was found capable of introducing 500 to 600 tons of dust in 24 hours. Nozzles with a life of 15,000 to 20,000 tons of dust handled were developed.

The apparatus is very simple, requires the attention of only one operator and produces no disadvantageous results on the furnace operation. The following data represent an average comparison of the daily yield and coke consumption with and without the Heskamp process over a period of about a month:

	Pig Iron, Tons/24 Hr.	Coke, Lb./Ton Pig Iron	Dust Blown in, Tons/24 Hr.
Without dust blast	919	2,130	...
With dust blast	978	2,030	122

The results were so good that one plant of the Vereinigten Stahlwerke equipped all its furnaces with the apparatus.

DRESSING SHEET AND TIN MILL ROLLS

By ERIC R. MORT,
Inland Steel Co., Indiana Harbor, Ind.

FORMULAS for establishing depth of concavity and cross of sheet and tin mill rolls have been in use for many years. The matter, however, has not by any means become an exact science, as there are many variables depending upon individual practice and experience. This contribution to the subject may be compared with that published in *THE IRON AGE* of April 23 last, written by Harry G. Wible. The present treatment is said by the author to contain the possibility of preparing charts showing the variation of the height of the arc representing cross with the chord of the same arc, whereby the roll turner can obtain the required concavity by direct reading.

IT is only in the past few years that efforts have been made to reduce the problem of the concaving of rolls to a mathematical basis. There have been attempts to establish the type of curve to which the curvature of a correctly dressed roll belongs. A number of writers describe it as hypocycloidal, but the correctness of this description is to be doubted. The grinders now in general use dress to a perfect arc of a circle, and rolls concaved in this manner give every satisfaction in the mill.

To the writer's knowledge, the mathematics of roll turning and/or grinding was first discussed by John Mort in a paper before the Swansea Technical College Metallurgical Society in February, 1929. This paper was abstracted in *Blast Furnace and Steel Plant*, December, 1929. The relations between depth of concavity and "cross," together with other factors, were established, the formulas submitted having been in use over a number of years.

It is with considerable interest, therefore, that the contribution of Harry G. Wible, in *THE IRON AGE* of April 23, 1931, is viewed. Mr. Wible's treatment of the subject differs radically from Mr. Mort's, and it was apparent from the outset that there would be a discrepancy in the results obtained by the two methods.

This present article is a comparison or discussion of the two methods and is undertaken in the hope that a solution of the problem will eventually result. It is certain that, if roll-turners are to make use of formulas in their work, this question must be settled for all time.

Mr. Wible gives no actual formulas, so the writer has taken the liberty of deriving the following from the information in his article. It is proposed to adhere to the nomenclature used by Mr. Mort, for purposes of reference.

a = Length of arc, equivalent to amount of "cross."

c = Chord of arc.

d = Roll diameter.

r = Roll radius.

h = Height of rise of arc.

$$h = 2 \left[r - \sqrt{r^2 - \frac{c^2}{4}} \right] \quad (1)$$

$$c = 4 \sqrt{r^2 - (r - h/2)^2} \quad (2)$$

h will be the amount of concavity in the roll. If the concavity is shared equally by the top and bottom rolls, h will be half the total concavity, the latter being expressed in inches or millimeters. It will be assumed that a is equal to c , which is sufficiently near the truth for all practical purposes.

An equation for finding c may be derived from (1) and will possibly be found rather more simple than (2).

$$\begin{aligned} h &= 2 \left[r - \sqrt{r^2 - (c/4)^2} \right] \\ -h/2 + r &= \sqrt{r^2 - (c/4)^2} \\ h^2/4 - hr + r^2 &= r^2 - (c/4)^2 \\ h^2/4 - hr &= -c^2/16 \\ c^2 &= 4(4hr - h^2) \\ c &= 2 \sqrt{4hr - h^2} \end{aligned} \quad (3)$$

Mr. Mort gives the following equation for finding

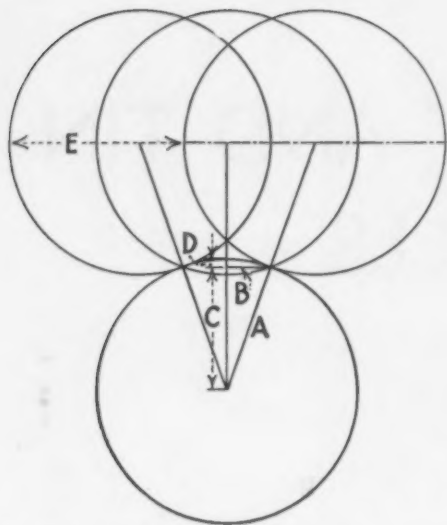


FIG. 1.—Schematic representation of roll cross, in which D is one-half the total depth of concavity, being equal to A minus C .

the "cross," given the radius of the roll and the depth of concavity required:

$$c = 2\sqrt{2hr - h^2} \quad (4)$$

from which may be derived:

$$h = r - \sqrt{r^2 - c^2/4} \quad (5)$$

Taking a 28-in. diameter roll and a cross of 2.50 in. and using equation (1) (Wible) we obtain:

$$h = 2 \left[14 - \sqrt{14^2 - (2.50/4)^2} \right] = 0.028 \text{ in.}$$

Now, using equation (5) (Mort):

$$h = 14 - \sqrt{14^2 - (2.50)^2/4} = 0.056 \text{ in.}$$

Using another of Mr. Mort's formulas for a check:

$$h = r - r \cos (a/0.0175 d) = 14 - 14 \cos (2.50/0.0175 \times 28) = 0.056 \text{ in.}$$

In this example Mr. Wible's formula gives a figure which is half that obtained by using Mr. Mort's formula. This is a particular case, however, and the relationship is not general, as will be seen from Table I. Table I (Wible) was calculated by means of Equation (1) and Table I (Mort) by means of Equation (5), both for 28 in. diameter rolls.

In the text of Mr. Wible's article appears the following: "As B is one-fourth of roll cross (e), concavity must be figured to find depth of d and then multiplied by 2, to give the total depth of concavity." (See Fig. 1.) This statement seems to warrant a little further explanation. The inference that there is a direct linear relationship between h and $(c/4)^2$ is

FIG. 2.—Determination of the depth H to which a roll should be dressed for concavity in providing the proper cross, X and Y being "straight-edge" points.

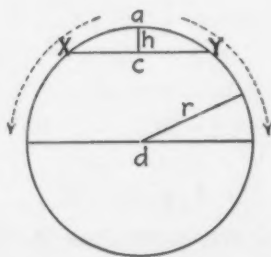


Table I—Depth of Concavity

c	Wible h	Mort h
1.0 in.	0.006 in.	0.009 in.
1.5 in.	0.012 in.	0.021 in.
2.0 in.	0.018 in.	0.036 in.
2.5 in.	0.028 in.	0.056 in.
3.0 in.	0.042 in.	0.081 in.

definitely not so, as a cursory inspection of the formula will prove.

An examination of Mr. Mort's formulas and figures makes it apparent that his argument hinges on one point. If x and y are the intersections of the straight-edge with the end of the roll body, is the distance h

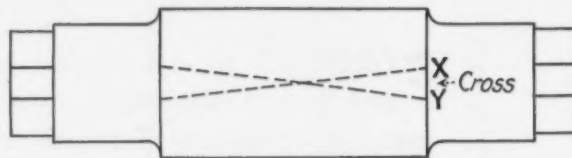


FIG. 3.—Plan of roll, showing the relation of cross to the roll dimensions.

the concavity to which the roll is dressed? This seems to be evident, as the crossed straight-edge must be in a horizontal plane to produce a chalk line of even width along the roll body. If, then, the figure illustrates the true state of affairs, the formulas must be correct, as they are simply deductions from the first principles of mensuration.

Should mill operators recognize the value of formulas as applied to roll turning, then charts may be prepared showing the variation of h with c for the different diameters in use, and within the limits to which rolls are ordinarily dressed. If the turner's orders are expressed in terms of inches of concavity, he has only to read off on the chart that "cross" which will give him the required concavity.

New High-Quality Foundry Iron

THE relation of quality of various kinds of pig iron to the quality of the gray cast iron obtained from the cupola process was discussed by Professor Piwo-warsky at the September meeting of the Verein Deutscher Eisengiessereien. The use of a low-carbon pig iron of special quality has been shown to insure quality in the resulting gray iron, while with high-carbon pig iron the presence of fine-grained graphitic structure is no guarantee of the fineness in the cupola product. In the latter case no better properties resulted from the use of ingot cast pig iron than from coarse-grained, sand-cast material. In a series of tests on low-carbon material, better results were obtained from melting a gray sandcast iron than from a white, metal-cast iron which had later been ferritized by heat treatment with development of temper carbon. By systematic plant-scale investigations the actual relations have been worked out, so that a cast iron of 3.5 to 3.6 per cent carbon may be produced with a tensile strength of 37,000 lb. per sq. in. The new special grade of iron is called "Migra-Eisen" (abbreviated from micrographite).

ELECTRONIC CONTROL OF MACHINERY

By RAYMOND FRANCIS YATES
Member, Institute of Radio Engineers

PRODUCTION gages, in which the movement of the anvils is amplified electrically by the remarkably sensitive vacuum tube, will perhaps bring into common use standards of precision that at present are unattainable in production work. This application, as well as other developments in the use of electronic tubes, is discussed in this concluding installment of a series of three articles.

APPPLICATIONS of ordinary vacuum tubes will be discussed in this article, the two previous installments having dealt chiefly with the photo-electric tube, mentioning the vacuum tube only when used in this connection as an amplifier.

When it is understood that an electronic tube is capable of detecting a degree of energy representing only a few billionths of an ampere, some idea of its remarkable sensitivity is obtained. It is, as a matter of fact, the most sensitive device yet discovered by man, so sensitive indeed that the great problem of those who would use it for purposes of mechanical measurements has been that of controlling this sensitivity. Research has finally brought this about and today new applications are constantly being found for the vacuum tube.

Literature on the theory of vacuum tube operation is so voluminous and so many men are familiar with this device that no attempt will be made here to go into this matter. The tubes mentioned are of the ordi-

nary radio type that may be purchased in any radio supply house.

Tubes Oscillate at Required Frequencies

There is one function of vacuum tubes that must be understood and that is their ability to oscillate or "regenerate" in producing high-frequency currents. By high-frequency currents is simply meant alternating currents that, instead of having 25 or 60 cycles per second, have a cycle oftentimes reaching up into the millions. The cycle of such circuits will depend upon several factors such as the amount of wire in the circuit (both straight and coiled), the capacity (supplied by condensers, both fixed and variable) and the amount of resistance.

Circuits may be designed to operate at practically any frequency by the use of the correct amount of inductance (the amount of wire, usually coiled) and the correct amount of capacity. Engineers do not often call upon ohmic resistance to control oscillating circuits.

The facts just outlined partially describe the simple theory of an interesting application of vacuum tubes; an application that, in the opinion of the writer, will become of great importance in the mechanical world. With this principle, mechanical measurements may be made with heretofore undreamed-of accuracy. Not only that, but in the case of measuring material like wire and sheet, these measurements may be made continuous and even ring alarms or stop machinery that is out of adjustment.

The diagram in Fig. 1 illustrates the operating principle of the measuring device suggested above. It

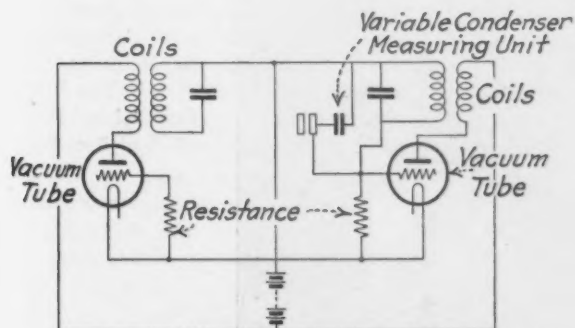


Fig. 1.—An oscillating tube circuit for precise mechanical gaging.

is really very simple and easy to understand. Two circuits are interconnected in such a way that one vacuum tube produces one frequency and the other, another frequency. If two sound waves of different frequency interfere with each other, a third note or frequency is produced and the frequency of this "beat note" will amount to the difference in frequency. Thus if 1000 and 1200 cycles meet, a beat note of 200 will be produced. This circuit is designed to function on this principle, although the frequencies involved are much higher than those mentioned. This beat note current is measured on a specially calibrated meter which translates the beat note into mechanical or metric units.

It was previously stated that frequency in such circuits is controlled partly by capacity. Capacity may be altered by means of a variable condenser having metallic plates separated by air and arranged so as to bring about a variable effective surface by rotation or by changing the distance between the plates. The later action is employed in the electric ultra-micrometer under discussion, the electrical measuring unit taking the form of a two-plate condenser arranged in a circuit that is extremely sensitive to a variation in distance between the plates. The slightest variation will change the frequency of the beat note and this in turn is registered on the special meter. In Fig. 2, the mechanical arrangement of the special condenser is shown, the plates A and B forming the units of the condenser while the anvils C and D contact with the work to be measured.

Other Successful Industrial Applications

This very interesting principle has already found several practical applications. One of them is in connection with wire mills where an accurate, automatic check is kept on the product. The same principle has been applied to paper mills, and the writer recently viewed, in its experimental form, a new measuring instrument for automatic screw machines. Many other

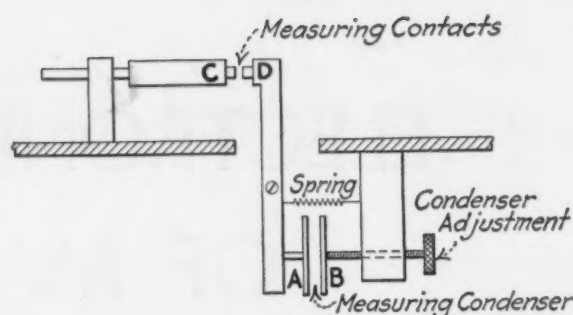


Fig. 2.—Gaging anvils and variable condenser of the apparatus diagrammed in Fig. 1.

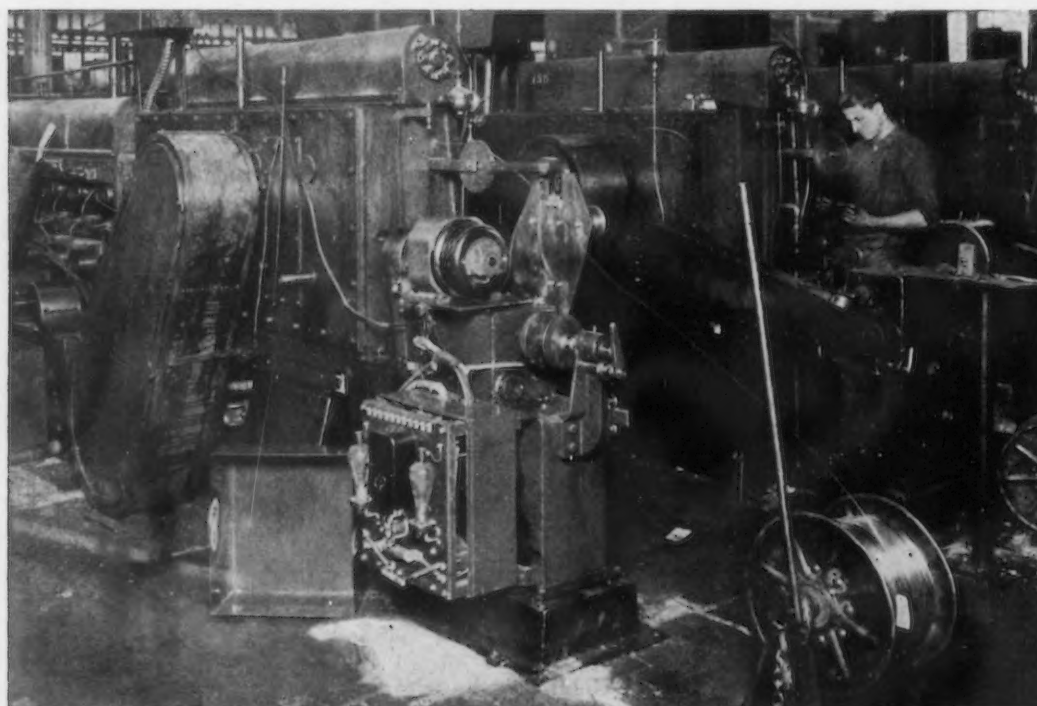
applications are rather apparent, and it seems obvious, even at this early date, that future inspectors and machine designers, not to mention foremen and superintendents, will be called upon to understand the operation of electronic devices.

The successful application of still another electronic principle should be of special interest to machine designers. Reference is made to a new type of electrical stroboscope that makes it possible to study the action of machine parts while they are functioning at very high speed. Regardless of the speed, the parts of the machine appear perfectly stationary although they may be revolving at 1800 r.p.m. The device is now being used in examining the valve action of airplane motors, to mention one of its more important uses.

Grid-Glow Tube Used in New Stroboscope

With this apparatus, beams of light flashing on and off in perfect synchronism with the moving parts to be observed form a perfectly stationary image. The rapid change in light is brought about by the charge and discharge of what is known as a grid-glow tube, another pure electronic tube.

(Concluded on page 1349)



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THE re-reeling spool speed of this wire drawing machine is regulated by thyatron (electronic) control equipment which compensates for increasing diameter of reel. This device was described in THE IRON AGE of Dec. 4, 1930.
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BOOK REVIEWS



Forecasting Business

Business Forecasting, by Dr. Lewis H. Haney, director, Bureau of Business Research, New York University; 378 pages, 50 illustrations. Published by Ginn & Co., Boston, 1931; price \$3.40.

One of the particularly interesting features of Doctor Haney's book lies in his explanation of his P/V line, which has become so well known to readers of *THE IRON AGE* through his studies on the economics of the metal and metal-working industries, which have been carried in this journal for several years. This relationship between price of commodities and the available volume, when analyzed in the light of knowledge of all the surrounding factors having a bearing, has given rise to the use of the line as an indicator of what the future holds in store.

Practically the whole book is devoted to the subject of the use of statistics in business forecasting. This involves many things beyond the mere possession of these statistics. For any definite purpose they must be selected for the work in hand, they must be analyzed not only from the bare facts as presented, but also with regard to seasonal movements, and the steady growth of output or other features through the progress of the years.

Business cycles are given extended treatment, with hypotheses concerning their causes both within and without a given business or a given country. The author traces depressions to the excesses of a boom period, makes them from this standpoint more or less psychological, and shows just how the expanding bubble collapses when finally pricked by a sufficiently sharp instrument. He traces the difference between major crises, such as those of 1921 and 1930, and the minor manifestations of 1924 and 1927. Human nature being what it is, he cannot see any likelihood of an early abolishment of the recurrent periods of excessively large business volume and distressingly poor business, lack of employment and destitution of profits.

Business in general is tied back to a question of man's requirement of monetary reward for his efforts. Profits loom large in the scheme, and it is a stretching after an undue measure of profits which produces a boom and establishes the conditions out of which eventually the collapse is bound to come.

Forecasting general business trends, forecasting for particular industries and the basis of stock market forecasting are made the subjects of separate chapters in the book. Still another chapter, having to do with the stock market, deals with the procedure of forecasting the tops and bottoms of major swings.

An interesting hypothesis brought out in the book is that the intermediate hump on either side of a business curve peak may with some measure gage the future history of that business. Thus a line of trend from the top of a hump occurring prior to the maximum of the boom preceding collapse, carried across to the top of the rebound after the first measure of the collapse has been felt, may be projected into the nearby future as an estimated trend line which may be expected to be fulfilled, at least to some reasonable degree.

All through the work Doctor Haney has drawn from his writings in various publications, including *THE IRON AGE*, to give point to his arguments and to show how the theory may be applied in practice. The illustrations are

clear and carefully prepared. Most of them carry a sufficiently comprehensive caption so that they make pretty much of a story in themselves, independently of the text.

In the preface the author recognizes clearly that a time of great adjustment, such as the present, is a somewhat dangerous period in which to write on business forecasting. He uses the present situation, however, up to the end of 1930, as the basis for a good deal of his reasoning, tracing the events preceding and following the collapse of the autumn of 1929, and showing the relationship between cause and effect all along the line. S. G. K.

Kempe's Engineer's Year-Book, 1931. Pages 3039; illustrations over 3000; crown 8vo., 5 x 7 in., limp leather binding. Published by Morgan Brothers, 28 Essex Street, Strand, W. C. 2, London, England; price 31s. 6d. net.

This monumental engineering work is now in its thirty-eighth edition. It has been revised throughout and brought up to date under the editorial direction of Loughnan St. L. Pendred, editor, *Engineer*, London. In addition to the usual general revision by Mr. Pendred, a number of associate editors and contributors, selected for their expert knowledge of particular branches, have subjected their respective sections to a thorough revision, making important alterations and additions. New data and tables have been introduced and old matter rearranged, while at the same time information no longer in accord with up-to-date practice has been eliminated.

Particular attention has been devoted to the sections relating to steam power, electrical engineering, electric traction, internal combustion engines, automobiles, aeronautics, refrigeration, highway engineering and gearing. All of these have had the advantage of extensive revision by specialists. Other important sections, either contributed for the present issue or revised, include naval architecture; marine engineering; hydraulics, water-power development; locomotives and other railroad rolling stock; harbors, docks and navigable waterways; bridges; cranes; mining; dredging; ferrous and non-ferrous metallurgy; gas and gas works practice; solid, liquid and gaseous fuels, pulverized coal; metering; oxy-acetylene welding and cutting; concrete, cement, mortar and plaster; machine tools; workshop practice; power transmission; bearings; lubrication; depreciation of plant and machinery.

These subjects, together with other important engineering information, occupy no less than 47 sections. The index, which is necessarily very complete in a work of this sort, fills 76 pages. A number of advertising pages will be found scattered throughout the text, together with more at the front and back.

Typography is good and so are the illustrations for the most part. They consist of both line cuts and half-tones, running through the work at an average of about one to each page. If any criticism might be leveled against such a book, it would perhaps take the form of trying to cover too much in one volume, and thereby making it unduly bulky. Apparently every branch of engineering, with the possible exception of chemical engineering, has been covered in extenso, whereas so many modern handbooks of engineering are confined to one or a small group of the numerous branches into which that phase of knowledge is now divided.

(Concluded on page 1348)

EMERGENCY MAINTENANCE TO

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WHEN a substantial repair job can be done in five days and it would take five weeks to get the new part, necessity for keeping a machine running or getting back into production at the earliest possible moment points to the repair. Electric welding has been used for a great variety of such services, some of which are outlined in this article. This form of maintenance is by its very nature more or less of a hit-and-miss proposition. That is, it occurs at unexpected and not necessarily frequent intervals. None the less, it calls for a high degree of preparation and the sort of background which the country doctor has in taking care of the ills of his patients.

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WHEN a production machine breaks down, and it is going to require several weeks to get the spare part, customers cannot be adequately served and business is likely to be lost. Just as in a break-down in the human system, however, it frequently is possible to make emergency repairs. An industrial doctor may not only tide over the period of threatened non-production but may, and frequently will, place the equipment in such

condition that no further attention is necessary. In this case it represents a permanent cure.

Such a service, involving frequently day and night work, without letup over Sundays or holidays, is being maintained by the Mattice Engineering Co., 2233 Vine Street, Philadelphia. In the course of a dozen years of practice along this line, many new ideas have developed in treating ailing machinery. Colonel Mattice has had a number of these schemes and methods and devices patented. A few of the cases he has treated are outlined here, not as something which can be applied directly in other cases, but merely as indicative of the sort of problem which comes up for solution and the character of solution which can be made.

Much of the work done by this company consists of electric welding. A mere joining together of parts by this means, however, would utterly fail in solving the problems encountered. Not only must the parts be joined adequately, but they must be so joined that alinement, contour and other features are maintained. It is right here that the accumulated experience obtained in hundreds of such cases makes it possible to secure a result quite different from that of merely joining the pieces together.

Making the Controlled Shrinkage Do Its Part

PROBLEMS of shrinkage of parts, drawing together sections which have been separated by cracking, maintaining strength in a member which has been broken by accident or abuse, all of these items must be considered. One case involved was that of repairing an arm in the rotor of an electric motor, and bringing that rotor back to the standard clearance inside the field ring, so that it could operate as before.

This arm had broken and examination showed that the break probably had occurred through a casting



Repairs to the lower jaw of an alligator shear used by the American Bridge Co. to cut steel billets up to 4 x 5 in. Such a billet is shown, newly cut, after the repair was made.

AVOID EXPENSIVE

SHUTDOWN OF MACHINERY

shrinkage crack. Consequently the $\frac{1}{8}$ -in. gap between rotor and stator was destroyed and the motor automatically shut itself down. This crack was closed through the controlled shrinkage of an electric welding job, after steel bands had been welded in position on the arm, either side of the crack, as a basis for the welding which was to join them.

The steel bands consisted of two pieces of steel plate bent to the proper arc so that, together, they would fit the elliptical contour around the cross-section of the arm. The two pieces were then welded to each other at their ends, being held in position by a through bolt passing through the arm. This bolt was then removed, a stud put in its place with the two ends considerably below the surface of the steel band, and "heads" welded on to both ends, thus forming a rigid structure. Then the welding together of the two parts of the arm was done in such manner that the shrinkage following the operation would pull the outer section in toward the hub by the amount required.

Prior to this repair an effort had been made by the plant engineer to jack the outer end back into place. This was unsuccessful, although a 15-ton jack was used. It was found that the company which had made the motor could not supply a spare rotor in less than five weeks, as the machine was not entirely standard. If the casting should prove faulty, and a second one had to be made, this time would stretch out to nine weeks. The welding job was completed in four days, and the machine has been running since then for many months.

Strengthening a Deficient Gear Wheel

A 6-FT. gear wheel on a press in the plant of the Atwater Kent Mfg. Co., Philadelphia, broke. This was a vital unit in the manufacturing line and could not be replaced by the maker of the press for a period of several weeks.

Rather than cease production over that period, the owner of the press had the wheel repaired by the Mat-tice Engineering Co. through the electric welding method. The machine was again in operation after a delay of about three days. In this case a brief analysis showed that the gear wheel was not strong

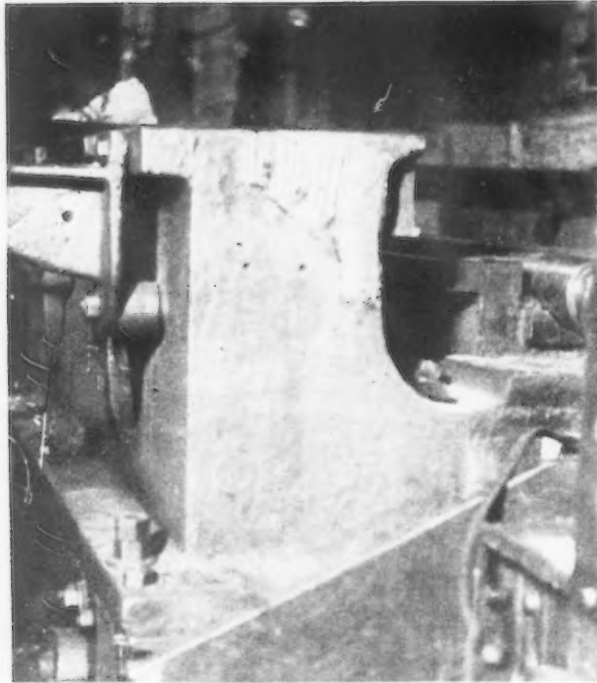
enough for its work. Consequently, in making the repair, it was given added strength as a part of the job. Particularly was the hub deficient in strength. This was corrected by welding a section of plate around the periphery of the hub on both sides, thus materially increasing its effective diameter.

Stitching Up a Cracked Ladle

A METHOD of repair of cinder ladles such as are used around steel plants has been the subject of one of the patents mentioned above. It has been dis-



Welded reinforcement around a broken armature arm. After the upper and lower supporting "rings" have been welded in place, they are drawn together the required amount through the welding action which joins them at A.

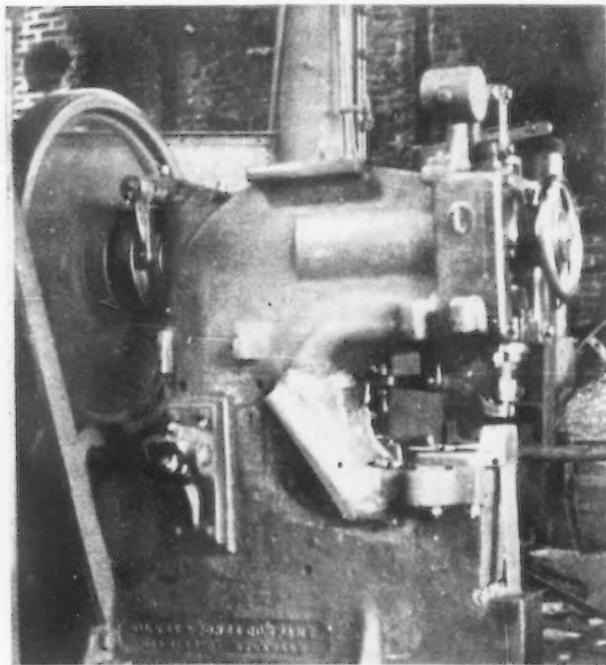


End of a 60-ft. plate shear, repaired for the Baldwin Locomotive Works.

covered that the cracking of these cast iron or cast steel structures is progressive. Not only this, but the initial crack has almost invariably revealed a length of double the thickness of material. The next extension of the crack goes a further distance equal to twice the thickness, etc.

Early methods of repair consisted in riveting on a 1-in. plate, using 1-in. rivets on 6-in. centers. This scheme has now been replaced by a "stitching" method.

In attacking this problem, the first thing done is



Throat of a press in plant of S. J. Creswell Iron Works, repaired by electric welding.

to burn (by acetylene torch) through the ladle, at the extreme end of the crack, a hole of a diameter equal to the thickness of the material. This has been found necessary if the crack is to be stopped at that point, for a small hole bored through there to round it off has proved utterly ineffective. A steel plug is inserted, and its ends welded in place.

Then holes of this same diameter are burned through, on either side of the crack, at a definite distance apart. Steel bars of that same diameter are bent into U-form, and placed like stitches across the crack, projecting into two opposite holes. The holes are bored about twice as far from the crack as the thickness of the material; hence, in a ladle made with



Stitches taken in a cinder ladle (here shown upside down) to overcome a crack. These stitches are about 16 in. long. (Bethlehem Steel Co.)

4-in. walls, these holes are about 16 in. apart and the U-bars are of corresponding length.

Working from the inside of the ladle, the ends of these U-bars are then securely welded into the holes. The natural shrinkage accompanying this operation draws the crack together and a bead is welded along the crack on the inside of the ladle, so that it will not leak molten slag.

Repair Job Doubled Life of Ladle

This job has been found by one of the steel companies to increase the average life of its cast steel ladles from 24 months to 52 months, and the cost of doing the job is a mere fraction of the cost of a new ladle. Cast iron ladles, lasting only about four months, are not readily susceptible to this manner of treatment and, although they cost new only about one-fourth as much as the corresponding cast steel ladles, yet short life makes them an expensive piece of property measured on the service they perform.

(To be concluded)

SOME METHODS AND EFFECTS OF MACHINE GAS CUTTING

By L. M. CURTISS

Superintendent Large Rolling Mills,
Lukens Steel Co., Coatesville, Pa.



MACHINE gas cutting made its first appearance in England about 1906 and, while it was fairly successful at that time, its commercial growth was very slow. The trouble encountered in the early stages was due to the machine's lack of range, inflexibility, and its inability to give good quality cutting in gages of plate where the demand would be the greatest. The torch problem, which required years for its solution, was not simply a matter of pressures and tip sizes but also of design, because all passages must be of the proper size and proportion with outlet orifices perfect in mechanical workmanship so that the gases would have an unhampered flow.

It is extremely difficult to picture the tremendous opportunities which this art has offered. Previous to the use of oxygen, heavy plate was practically limited to a 2-in. thickness in gage, which had to be sheared mechanically in straight lines with the usual out-of-flat condition characteristic of all sheared material.

Compare with this a 20 to 30-in. cut, which can be made with oxygen today, not only in straight lines but also in a curved or irregular direction, with the cut edge either vertical or beveled and without the usual shear distortion. This progress in heavy cutting has created in the steel world a demand for heavy material to be used as machine parts, or in high pressure vessels where elevated temperatures must be withstood. Today there are thousands of uses for gas-cut heavy steel plate which can be met in a few hours with the aid of simple templates in place of complicated patterns, thus avoiding days of preparation and insuring reliable shapes cut from rolled steel.

How the Wage Problem Was Met

Little thought was formerly given to the actual cost of the operation, as the advantage to be derived was so great that it overshadowed the expense of cutting. The cutters were generally paid a straight hourly rate, and were given general instructions by the foreman on how the job should be done. An incentive wage payment

METHODS of machine gas cutting heavy plate and the metallurgical effect upon the metal after it is cut, as well as certain economies which may be realized, are dealt with in this article which is an abstract of a paper before the Thirty-second Annual Convention of the International Acetylene Association in Chicago, Nov. 13. The practices and results described apply only to machine gas cutting.



plan was considered very illogical, as a large plate could easily be spoiled by hurried work, and because the labor involved in cutting was not the initial consideration. The cost of oxygen and acetylene consumed in cutting heavy thicknesses is several times the cost of the labor involved. There was the danger that an operator in accomplishing his task in the least possible time would use excessive oxygen, thus more than counteracting any benefit derived from fast work.

The Lukens Steel Co. tackled this problem with many misgivings and were many times advised that it could not be solved. After much study, however, a payment plan was devised whereby each man was paid for the exact amount of work accomplished and, in addition, a bonus was paid on the amount of oxygen saved below a set standard; a penalty was also applied for poor workmanship.

It is gratifying to say this plan was successful from the beginning, and each succeeding month showed an improvement in labor efficiency. The oxygen consumption instead of climbing, as feared, took a downward course, which resulted in a remarkable saving. The quality of cutting was in no way impaired and the amount of rejected material, due to carelessness, was materially reduced.

Effect of Cutting

There has been considerable discussion, especially among users, as to the effect of gas cutting on the material

cut. When observed microscopically, the cut edge is found to be materially altered as compared with the original metal. Apparently this is a physical change, as the pearlitic steel has been transformed into an unstable condition, taking one of three forms—sorbite, troostite, or martensite, according to the amount of carbon present in the steel and the speed with which the metal is cooled. This physical change is due to the metal adjacent to the cut being heated considerably above its critical range and cooling quickly through this range. The drop in temperature is caused by heat conductivity of the cold surrounding metal, by radiation losses, and by the fact that the heat is applied only momentarily at any one point, the machine being in constant motion while cutting.

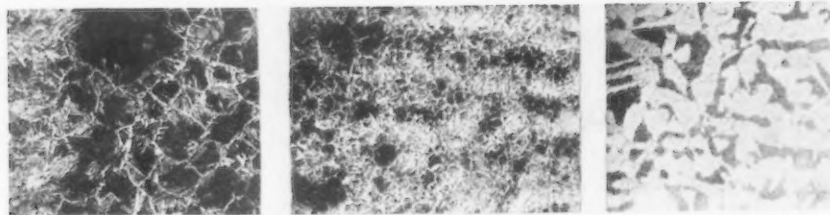
Another interesting change is the tremendous grain growth which occurs on the gas-cut edge, the grain size gradually tapering back to the normal size in the original metal. Ordinarily, grain growth is caused by holding a piece of steel at an elevated temperature for a prolonged period of time, both temperature and time being functions of its progress. The development of the grains in this case, is due principally to the intensity of the heat, as the time element is very short.

The change in this altered area has previously been considered as merely a physical without any chemical alteration, but it has now been discovered that the carbon content is increased on the burned edges. When the specimen is annealed, however, this carbon difference is equalized. Carbon analyses were made from layers 1/32 in. thick, planed from the gas-cut edges of various plates. Analysis No. 1 represents the outside layer, No. 2 the second layer, etc.

Causes of the Increase in Carbon

The next step was to try to find the cause of this carbon increase, the three possibilities being:

- (1) Absorption of carbon from acetylene.
- (2) Pearlite and sorbite might give dif-



PHOTOMICROGRAPHS of gas-cut edge from a 6-in. plate. Sorbitic structure (left) of gas-cut edge. Sorbitic and pearlitic (center) at transition stage. Unaltered pearlite (right) of original plate.

Below

Comparative structures of burned edge before and after annealing. Sorbitic structure (left) of gas-cut edge. Pearlitic structure (right) after annealing.

Tables Showing Carbon Analyses of Burned Edges

Before Annealing	Plate	Plate	Plate	Plate
	A	B	C	D
No. 1.....	0.32	0.27	0.16	0.12
No. 2.....	0.17	0.27	0.12	0.12
No. 3.....	0.17	0.23	0.09	0.11
No. 4.....	0.10	0.22	0.10	0.10
After Annealing	Plate	Plate	Plate	Plate
	A	B	C	D
No. 1.....	0.19	0.21	0.08	0.10
No. 2.....	0.19	0.23	0.08	0.11
No. 3.....	0.18	0.22	0.10	0.10
No. 4.....	0.17	0.23	0.11	0.10

ferent carbon results under the same method of analysis.

(3) An actual local change due to the physical alteration.

Carbon analyses were taken from several samples, some of which were cut with acetylene, and some with hydrogen, the idea being to compare the effect of the two fuels and to eliminate, if possible, the thought of any carbon absorption by the acetylene. The shavings were taken as previously described, each one representing 1/32 in. in thickness.

The results, as shown in a table, indicate that any increase in carbon on the outside cut edge cannot be attributed to the carbon in the acetylene as the hydrogen may also give similar results.

The No. 1 shavings were annealed in order to reestablish the pearlitic condition and were then analyzed for carbon. These checked identically with the original No. 1 samples. This, of course, eliminated the possibility of obtaining a difference in carbon from sorbite and pearlite under the same method of analysis.

The one remaining explanation for the increase in carbon of the outside gas-cut edge is that the pearlitic patches in the original steel have been absorbed while passing through the transformation range, forming what is known as austenite or a solid solution. When the cooling action starts, the ferrite is thrown out of the solid solution first, thereby making the remaining solution higher in carbon.

In view of the fact that the hottest part of the metal is next to the kerf, the carbon migrates toward this hotter zone, where it is finally concentrated. Sorbite is formed because the metal is cooled so quickly that the pearlite does not have a chance to reestablish itself. This is checked by the fact that, whenever a gas-cut piece is normalized or annealed, the area of increased carbon and altered physical structure disappears completely and the steel returns to its original state.

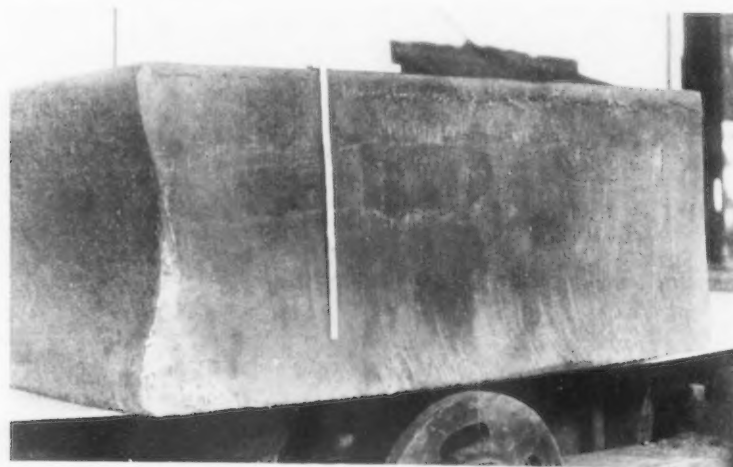
These physical and chemical changes in the steel leave a thin hardened zone on the outside edge, the penetration of which is usually very superficial. With ordinary steels of 0.30 per cent

carbon and under, no particular difficulty is experienced in bending or fabricating as the sorbitic hardening is not very intense. With high-carbon and alloy steels, the precautions of annealing or machining should be used to remove the hardened edge.

There are some exceptions, however, in the low-carbon steels which should be recognized—where a bend occurs with the gas-cut edge on the outside surface, or in a machine part where stresses are concentrated at one point and the member is subjected to the fatigue of intermittent tensile stresses. In cases of this kind, all traces of gas cutting should be removed by annealing, planing or grinding. It is extremely necessary to remove any nicks or notches, as they are particularly susceptible to the effect of intermittent stresses, and form an excellent opportunity for the development of incipient cracks, which in turn may develop into a large fracture.

Preheating the Steel Advisable

If the simple precaution is taken of preheating the steel before gas cut-



Gas cut through steel slab 22 in. in thickness.

Table Showing Carbon Results from Cutting With Acetylene and Hydrogen

	Plate E		Plate G		Plate J	
	Acetylene	Hydrogen	A	H	A	H
No. 1	0.18	0.21	0.20	0.22	0.28	0.31
No. 2	0.18	0.19	0.16	0.18	0.26	0.26
No. 3	0.17	0.16	0.16	0.15	0.24	0.24
No. 4	0.17	0.16	0.15	0.15	0.24	0.23

ting, the cooling effect will be retarded and this will prevent, to some extent, the formation of sorbite and reduce the hardness. High-carbon and alloy steels, such as chrome-vanadium, which are particularly susceptible to temperature changes, should always be preheated, and should be annealed immediately after cutting to reestablish the pearlitic condition and to remove all cooling strains.

Hot cutting is not only beneficial to the steel, but is also economical in the use of oxygen. Any steel is more easily oxidized at elevated temperatures than at atmospheric temperature. Special care must be exercised, however, on particularly thick sections, where the interior is considerably hotter than the exterior. The oxygen may start its penetration without much difficulty but, upon entering the interior of the section, may

fail to go through and will cause a flare up in the cutting. This stoppage is caused by the hot center, which oxidizes so readily that a cavity is formed on the inside of the piece and the flame, once being diverted, is not easily adjusted.

The operator at this point usually makes the wrong move by increasing the pressure, which intensifies the trouble and increases the size of the cavity to such an extent that the slab may be ruined. There are some differences of opinion as to the proper temperature of the steel for the most efficient use of oxygen to obtain the correct penetration, and to leave the steel in the best shape metallurgically. For all practical purposes 500 to 600 deg. F. should give the best combined result.

Quite a problem is presented in making clean, economical cuts in steel

slabs between 20 and 30 in. thick. A generous supply of fuel is needed to support the preheating flame. High oxygen pressure is required to penetrate the entire thickness, so that the molten oxide may be blown out of the kerf. If excess pressure is used, a large amount of oxygen passes straight through the cut without having any oxidizing action upon the metal and is consequently wasted. In order to compensate for this loss, the pressure may be reduced and the volume increased by the use of more than one regulator, and in some cases by using special equipment, such as a three-hose torch with large openings fitted with an extra large hose. The illustration shows a gas-cut slab 22 in. thick, which presents a remarkably clean surface. Cuts of this thickness are not unusual and a 28-in. gage has been cut with excellent results.

▲ ▲ ▲

Sheet Steel Piling Used in Coal Silos

A NEW use for sheet steel piling has been developed by the Bethlehem Steel Co., which has applied that material to the construction of coal silos for the Lehigh Coal & Navigation Co. and for M. Jennings & Sons, Philadelphia, and a crushed stone bin for the Union Paving Co., Philadelphia.

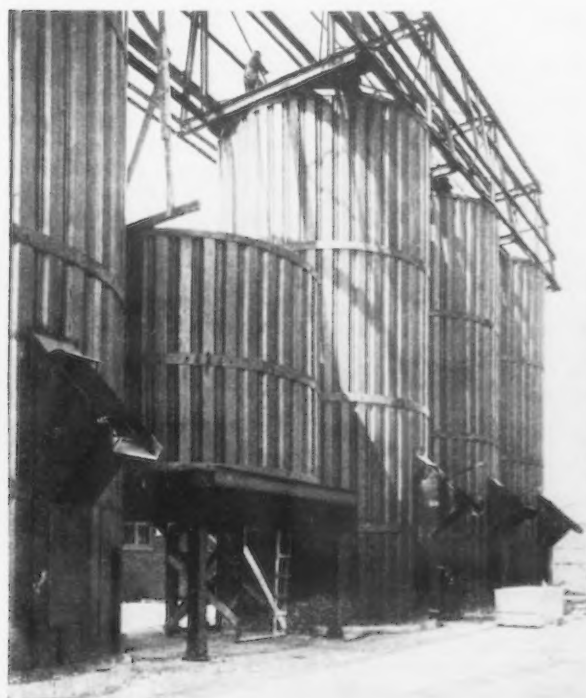
In building a coal silo, a circular base ring is placed on a concrete foundation, if the silo is of the ground type, or on a steel platform, if of the elevated type. Each section of piling

is then set in place by raising it high enough to engage the interlock of the adjacent pile and dropping the section.

Riveting is not required except on the circular base angle at the top and bottom of a silo and on the intermediate hoops. This is suggested as an advantage in permitting speed of erection. Other advantages claimed for this type of construction are the largest possible storage volume in the smallest area of ground, use of standard forms and equipment without spe-

cial sections in its erection, and extreme mobility, as the interlocking piling may be readily disassembled and the silo or bin reerected on another site. This last feature is also pointed out as implying a substantial salvage value for the material employed.

Use of sheet steel piling by the coal industry and for the storage of crushed stone is expected by the Bethlehem Steel Co. to lead to adoption of this type of construction for storage bins in other fields.



GROUND and elevated-type (at left) coal silos of sheet steel piling used by the Lehigh Coal & Navigation Co., Philadelphia. (Below) Storage bin for crushed stone, built of sheet steel piling, for the Union Paving Co., Philadelphia.





IS A WIDER USE OF BESSEMER STEEL IN PROSPECT?

A REBIRTH of the Bessemer process is reflected in improvements, notably in the liquid pig iron and in the air control, which have made the resulting product better fitted for some of the uses to which it is put. Bessemer steel has held its own at a fairly stationary rate of production for the past decade, although its share of total steel output has declined owing to the steady gains in open-hearth operations.

But some of the earlier shortcomings of Bessemer steel are being overcome, and Prof. Richard S. McCaffery, University of Wisconsin, believes that the stage is set for a wider use of the product, for which, he declares, ore reserves are ample. His views in detail were given in a paper, abstracted below, which was read before the recent meeting of the American Iron and Steel Institute. Discussions, also appended in abstract, were presented by Dr. G. B. Waterhouse, Massachusetts Institute of Technology, and Hugh P. Tiemann, assistant metallurgical engineer, Carnegie Steel Co.

Abstract of Professor McCaffery's Paper

IN 1905 open-hearth steel production exceeded that of the Bessemer process. Since then open-hearth steel has proceeded at an increasing ratio of production until only a few years back, when Bessemer steel began to reassert itself. A most interesting comeback has been taking place, which many users of steel seem to have overlooked.

A change of conditions and of economic factors has been taking place for some years. In this country we now have relatively a much larger Bessemer ore reserve than we formerly possessed; in fact, a reserve amply sufficient for a Bessemer operation of present scope for a considerable time in the future.

Then, too, there have been scientific and technical advances in fields parallel to that of metallurgy. These have greatly increased our knowledge of metallurgical chemistry; they have given us new instruments that help us to obtain better process control. And new designs of equipment and machines have been developed which enable us to make this new knowledge available in production.

All these things were applied to the open-hearth process first and it is only lately that the Bessemer process has received the consideration which it deserves.

Our Bessemer process of today, while not changed in principle, is in many respects, particularly in details, quite different from what it was a few years back. All the new refine-

ments tend toward uniformity of product and improvement in quality.

Our largest uses of Bessemer steel at present are in the manufacture of skelp for welded tubes, sheet steel and tin plate, screw stock, wire, hoop and automotive forging stock. These are products in which Bessemer has either maintained or strengthened its position. Typical analyses are given in Table I. It will be noted that almost all of them are of very low carbon content and many are of very low silicon content. To produce such low-carbon low-silicon metal, it is not necessary to have high manganese, because special soft Bessemer metal is made with C 0.02, Si 0.002 and Mn 0.01 and for certain uses has been highly satisfactory.

Metallurgically, this fact that it is the very low-carbon content Bessemer steels that have maintained their ascendancy is very interesting. It happens that these steels are the most difficult to make, because of the nicety of control that must be exercised. That exactness of control has been obtained in Bessemer, so that these Bessemer steels cannot be displaced by steels made in other ways. This shows that a remarkable development has taken place within recent years.

Trend Toward Larger Converters

In the future the Bessemer process will be carried out in larger converters than those we now employ. At Hoesch in Germany they have recently started using a 45-ton converter.* This increase in size does not mean an increase in blowing pressures. And high air pressure does not mean high tonnage production.† A reduction in pressure may cause a considerable decrease in blowing time and a decrease in blowing energy.

Table II is reproduced from the article to which reference is made.

Discussion by Dr. G. B. Waterhouse

TWO of the main reasons why Bessemer steel can be made better today than in the past is because of improvements in regard to the two chief raw materials: liquid pig iron and air. Blast-furnace practice has improved steadily and continuously in recent years. Pig iron is much more uniform from cast to cast, in regard to analysis and initial temperature.

Larger ladles are used, handling is better and the capacity of mixers is much larger on the average than it used to be. Many can remember when a 150-ton or, at most, a 250-ton mixer was considered ample, while today 1000-ton and 1250-ton mixers are fairly common. Mixer practice is much better than before, the general result being that iron is delivered to the vessels much more uniform in composition and temperature than formerly. The blower can count on this and has a most important factor in his favor in obtaining uniform blowing conditions and uniform final steel.

Experience has proved that without suitable and proper iron good steel cannot be made, and good Bessemer practice is joined inseparably to good blast-furnace practice. The improvements in regard to air, emphasized by the author, relate to a separate electrically-operated blower for each vessel, under direct control of the blower, so that pressure or volume can be modified as desired at any stage of the heat. There is no doubt as to the importance of such control and the good results that will follow after proper experimental work.

Use of a High Temperature

Stress is laid in the paper on a method of conducting the Bessemer operation different from that usually followed, whereby a high temperature is rapidly obtained in the converter, carbon is oxidized preferentially to silicon and considerable residual silicon is left after the drop of the flame and the turning down of the vessel. It is then hoped this silicon will speedily react with the oxide of iron in the bath, and that cleaner and better final steel will be the result.

Considerable experimental work will be needed to prove whether such practice can be followed regularly, and

*THE IRON AGE, July 31, 1930, page 288.

†THE IRON AGE, March 6, 1919, page 626.

whether as good or better steel will be thereby obtained. The suggested practice is not comparable with that followed in Sweden, where moderate temperatures are employed, where the total carbon of the bath is much lower to begin with and where the manganese is so high at the beginning (between 3 and 4 per cent) that manganese persists in the bath at all stages, protecting it from over-oxidation.

Also, experience has shown that steel blown at high temperatures with considerable residual silicon has given poor results. The writer remembers disastrous results with rails when such practice was followed inadvertently. Better effects would seem to be indicated if every advantage were taken of the application of new appliances and the new knowledge regarding steel making.

Importance of Proper Deoxidation

One of the main troubles with Bessemer steel for many purposes is imperfect deoxidation and removal from the steel of the deoxidation products. Attention should be given to deoxidation of the blown metal in the converter, at least in a preliminary way, to be followed by the final addition in the ladle. In this respect every lesson taught by the successful recent work in producing clean open-hearth steel should be applied to the Bessemer process.

Some years ago very promising results were obtained at Joliet by the use of liquid ferromanganese. Since that time electric furnace practice in the melting of spiegeleisen or ferromanganese has improved considerably.

Hot metal, taken direct from the mixer, is a splendid partial deoxidizing agent when the final composition of the steel will admit its use, the silicon, manganese and carbon all being efficient. Also, conditions in the converter are more favorable than those in the ladle. The bath is hotter and less viscous, mixture is more readily obtained if liquid additions are made, and with proper time allowed, the various oxides and silicates produced will more readily coalesce and rise to the slag. Perhaps this can all be summed up by saying that the applications of the physical chemistry of steel making, which have been shown to be of great value when applied to the open-hearth process, can and should be applied to the Bessemer process.

Low-Carbon Steel Not Hard to Make

The author indicates that low-carbon Bessemer steels are the hardest to make, meaning the steels used in skelp, sheet bar and wire products. This is not true. Such steels are easy to produce; the flame gives a very definite indication when to turn down, and the success in making such steels of remarkable uniformity from heat to heat is one of the reasons why Bes-

TABLE I.—ANALYSES OF VARIOUS BESSEMER STEEL PRODUCTS

SOFT BESSEMER STEEL GRADES				
Percentages	Carbon	Manganese	Phosphorus	Silicon
Skelp	0.06-0.08	0.35-0.45	0.090	0.045
Soft wire	0.06	0.30 max.	0.10 max.	0.05 max.
Medium wire	0.07-0.10	0.30-0.45	0.110 max.	0.08 max.
Hard wire	0.12-0.16	0.80-0.90	0.110 max.	0.08 max.
Sheet and tin bar ..	0.08	0.40	0.100	0.040
Screw stock, ordinary	0.08-0.12	0.70-0.90	0.08 -0.12	0.10 min.
Screw stock, special grades				
High carbon	0.25-0.35	0.70-1.00	0.115	0.075 min.
Special	0.08-0.16	0.75-1.10	0.08 -0.12	0.20 -0.30
A. S. T. M.	0.08-0.16	0.60-0.90	0.09 -0.13	0.10 -0.18
G. M. C.	0.08-0.16	0.70-0.90	0.09 -0.13	0.10 -0.15
S. A. E. 1112 ..	0.08-0.16	0.60-0.80	0.09 -0.13	0.075-0.15
S. A. E. 1120 ..	0.15-0.25	0.60-0.90	max.-0.06	0.075-0.15

semer steel is still used for such purposes.

It is claimed in the paper that there are no technical reasons why the use of Bessemer steel should not extend into the fields now served by other processes. But in this respect the limitations of the process must be carefully kept in mind, such as the high phosphorus in the steel and the small amount of scrap used.

Many other points could be touched on, such as the proper use of steam in the process, the importance of correct bottom design and the use of good refractories, the addition of roll scale in the early stage of the blow, the great importance of good Bessemer practice in the duplex process of steel making and the importance of the new methods of control in furnishing the open-hearth the proper kind of blown metal, and the possibility of making many alloy steels by the Bessemer process.

Well-made acid Bessemer steel cannot be surpassed for many purposes, and the process deserves the increased attention it is receiving.

Discussion by Hugh P. Tiemann

MUCH of the prejudice which in the past has led to the substitution of open-hearth for Bessemer steel has been based on the erroneous assumption—an assumption not discouraged by organizations that produce only open-hearth steel—that decrease in ductility, resulting in brittleness, is directly proportional to the

phosphorus content for all grades of steel, whereas any such effect is largely a function of the carbon content. It was clearly pointed out by Prof. H. M. Howe over 40 years ago that in the case of soft steel the effect of phosphorus on ductility, in the percentage in which it occurs in Bessemer steel, may be very slight and of no practical significance.

Advantages Due to Phosphorus Content

Advantages of Bessemer steel for certain purposes, mentioned in the paper, are largely due to the phosphorus content. And it is less costly to obtain it naturally in Bessemer steel than by a special addition to open-hearth steel. In the case of screw stock, open-hearth steel, even of the same nominal composition, is not so satisfactory as Bessemer. For tin plate and other thin sheets the phosphorus prevents sticking after they have been rolled in packs.

Chemical Constituents of Various Steels

In Table I certain changes seem advisable for the sake of accuracy, and also to prevent any misunderstanding that certain figures are specified limits. These changes are as follows: Skelp: C 0.08 max.; Mn 0.30-0.60; P 0.11 max.; S 0.08 max.; soft wire: S 0.08 max.; medium wire: Mn 0.30-0.50; sheet and tin bar: C 0.10 max.; Mn 0.30-0.50; P 0.11 max.; S 0.07 max.

TABLE II.—RESULTS OBTAINED BY INCREASED NUMBER OF TUYERES AND DECREASING BLAST PRESSURE

	Old-Style Bottom	New-Style Bottom
Number of tuyere blocks, each containing twelve 5-in. tuyeres	23	35
Weight of mixer metal, lb.	47,000	50,000
Blast pressure at engine, lb. per sq. in. .	28	22
Total engine revolutions per blow	589	443
Time of blow, minutes	14	10 1/2
Comparison of time, per cent.	100	69
Comparison of power, per cent.	100	60

†"The Metallurgy of Steel," 1890, page 69.

It is generally recognized that S.A.E. 1112 and the corresponding identical requirements of the A.S.T.M. for screw stock are standards, and might therefore be considered as "ordinary," rather than "special." There is also the former standard of both the S.A.E. and A.S.T.M. with sulphur 0.075-0.150 which is still used to a certain extent. Listed under special grades of screw stock, G.M.C. should show Mn 0.60-0.90 and S 0.075-0.15; S.A.E. 1112 should show Mn 0.60-0.90 and S 0.10-0.18. It is questioned whether it was intended to have S.A.E. 1120 included, as this covers open-hearth screw stock and not Bessemer.

For vitreous-enameled sheets or panels where extreme flatness is necessary a very soft material is employed to avoid or offset any warpage from repeated heating at relatively high temperatures in the enameling process.

In discussing deoxidizing methods it might be pointed out that, in the case of rimmed steel with carbon usually not over 0.15 or 0.20 per cent and manganese not over 0.50 per cent, much of the reaction takes place in the mold. If the manganese is higher, and especially if there is more than a trace of silicon in the finished steel, the rimming action will be materially decreased if not entirely suppressed.

Details of Swedish Practice

In connection with Swedish practice, attention may be called to a very complete paper by Prof. Richard Akerman before the American Institute of Mining and Metallurgical Engineers. He points out the shortening in time resulting from an increase in blast volume (per minute) and a decrease in blast pressure. In regard to effect of composition and initial temperature on residual silicon and manganese the following extract is given:

When the silicon in the pig iron is not higher than in the pig irons given in a table (maximum 1.14 per cent), almost all the silicon is necessarily removed before the "boil," unless the blow be very hot, either because the pig iron contains more manganese than usual for the Bessemer process, or for some other cause, as, for instance, an initial high temperature of the pig iron. But in the last-named case the removal of the silicon is delayed by the temperature, and the reason for it is the already oft-repeated fact that, when the temperature rises above the melting point of pig iron, the tendency of carbon to be oxidized increases more rapidly than that of silicon.

With manganese the case is somewhat similar, so long as there is not over 2 per cent of it in the pig; for the incomparably greater part of the manganese is then removed before the boil. But with higher contents of manganese (4 to 6 per cent), as shown by the Westanfors series, the oxidation of the manganese is more evenly distributed throughout the entire blow. According to J. A. Brinell, the following are the ordinary results at Westanfors, where the blow is always direct, and there is, therefore, no subsequent addition of manganese:

In steel and iron produced from pig iron with 4 per cent manganese

Percentage Relations of Three Elements

Carbon	1.3	1.1	0.9	0.7	0.5	0.3	0.2	0.15
Manganese	0.6	0.55	0.5	0.4	0.3	0.2	0.15	0.12
Silicon	0.06	0.05	0.045	0.045	0.04	0.03	0.02	0.015

and 1 per cent of silicon, the carbons in the product are accompanied by the percentages of manganese and silicon shown under them.

In Bessemer steel from pig iron with 5 to 6 per cent of manganese and 1 per cent of silicon, the corresponding figures are as follows:

Carbon	1.3	1.1	0.9	0.7	0.5
Manganese	1.25	1.05	0.9	0.7	0.6
Silicon	0.25	0.2	0.15	0.12	0.1

Before we had learned to understand the workings of an unusually "hot" Bessemer blow and to regulate properly the heat in question, such exceptions could occur, even in this country, as that a product was obtained quite unexpectedly with 0.5 carbon, 1.10 manganese and 0.5 per cent silicon.

A more recent statement of the position of the acid Bessemer steel process in Sweden, made by Bengt Kjerrman, "Some Comments on Swedish Steel Practice," 1926 *Transactions American Society for Steel Treating*, may be of interest:

The Bessemer process is much more expensive than the open-hearth process, mostly because of the necessity of using a high grade of pig iron with large amounts of silicon and manganese. In the acid Bessemer the amount of phosphorus, as well known, is not reduced. On the contrary, one will find a slight increase due to the waste of metal, and thus we have to use a pig iron low in phosphorus.

Anyhow, many customers are willing to pay the price, and what is specially interesting to note, is

that they are coming back after the World War in spite of being forced to use other materials during all this time. It, therefore, really seems to be a question of special good quality, when they have not been able to find a sufficiently good material in their own countries, even when the need resulted in putting forth effort in this direction.

Much along the same lines is a bulletin by Prof. Groume Grjimaile in a 1913 publication of the Polytechnic Institute of St. Petersburg, Russia. He advocates the use of hot metal relatively high in manganese and silicon. If the metal is sufficiently hot a part of these elements will remain in the steel after the carbon is nearly all eliminated. He claims that the residual manganese and silicon, being uniformly distributed throughout the bath, will effect better reduction of the iron oxide present, and will also result in economies in the use of deoxidizers. He emphasizes the fact that the temperature should not be too high, and, if necessary, the steel should be held in the ladle.

Other recent papers of interest are by Prof. G. B. Waterhouse, "Will Bessemer Production Drop?" *THE IRON AGE*, July 5, 1928, page 8, and by J. R. Miller, "Bessemer Steel, Its Properties and Use," *Blast Furnace and Steel Plant*, October, 1930, page 1602.

Makes Plea for Older Employees

Age and slight physical defects should not bar men from employment, according to Charles B. Cook, vice-president, Royal Typewriter Co., Inc., Hartford, Conn., who addressed the Employment Managers' Association of that city recently.

"A man who has given the best of his life to his line of industry should at the age of 55 or more receive some consideration by the company to which he has given so many years of satisfactory service," he stated. "It stands to reason that older and more reliable men mixed throughout the organization have a real stabilizing effect on the less mature judgment of many of the younger men. These older men know what quality is, what loyalty is, what service is, and what the company expects of a man. True, they use their brains more and their physical capacity less—and rightly so. Any man who remains in one industry with one company a number of years cannot help but add to the industry's prestige and success, and

he should not be forced to look upon his declining years with bitterness and fear. Industry must protect these men in their rights."

Referring to men with slight physical defects, the speaker said that rigid physical examinations of applicants for jobs are unwarranted except where the work is hard and dangerous. Those having slight defects should be given work within their capacities, he asserted. He recommended the setting up of a central examining bureau where local physicians would examine men and give them certificates listing lines of work for which they are qualified.

Shipments of enameled sheet metalware in September, as reported to the Bureau of the Census, rose to 307,068 doz., from 251,544 doz. in August, and in volume were the largest for any month of the year, except in March, when they amounted to 312,916 doz. Reports are made to the bureau by 15 manufacturers, representing approximately 80 per cent of the industry.

Telescoping Upright Tiering Electric Trucks

By C. B. COOK

Elwell-Parker Electric Co., Cleveland

ENCOURAGED by the waste-saving possibilities of the unit-load skid system, management has looked with great favor upon the use of special and deeper containers to suit the product. To realize the greatest earning power from transient or permanent storage floor space, producers of electric lift trucks have been called upon to build tiering trucks. This type places loads in tiers or stacks, from which goods can be removed with ease as required.

Enough manufacturers have attained that ideal for economical storage to understand there are conditions that defeat the system and continue to withhold the satisfaction of having finally squeezed the maximum return from the floor space set aside for storage purposes. These are the overhead obstructions found in many plants.

Electric truck manufacturers have risen to the occasion and are producing lines of 1, 2 and 3-ton fork and platform tiering trucks with collapsible or telescoping uprights. These will load in low headroom, as in cars, deliver through low doorways or beneath low lineshafts, service lines, or roof trusses, yet store to levels restricted only by the roof or the fire underwriters' specified limits.

Storing is frequently done in buildings quite unsuited to the purpose. Costly floor space demands narrow aisles. Machines of the three or four-wheel type, one of which is illustrated, are now available.

This particular electric truck is 38

ECONOMY in the handling and storing of material is furthered by the use of tiering trucks. The machine illustrated will remove loaded skids from freight cars and can be operated in 70-in. aisles.



in. in width, 100 in. in length, with a 26½ in. x 54 in. platform that tiers in the open to a height of 10 ft. Yet it will pick up its load of 4000 lb. at 7 in. above the floor in a railroad car only 83 in. high inside. Likewise, it will stack in a car to the roof, for its platform rises to 61 in. before its secondary uprights begin to rise.

This machine is of the intermediate capacity, while a smaller three-wheeled type will care for the lesser weight loads. The independent control of brake and power for ramp performance is employed. The travel, hoisting and tilting or auxiliary loading and unloading attachments are all

driven by fuseless motors. Edison or Exide batteries or Ready Power gas-electric power is provided.

Two lines of these machines are made by the Elwell-Parker Electric Co. in 3000, 4000 or 6000-lb. capacities, and with 7-in. or 11-in. height platforms. The one illustrated picks up a skid, elevating it to any height up to 118 in., yet it may be driven through a 7-ft. door, 42 in. wide. This truck steers on all four rubber-tired wheels and operates in 70-in. aisles. It is actually a telescoping upright-type tiering truck, since the secondary uprights telescope or slide down inside the stationary uprights.

New Motor for Steel Mill Service

FOR heavy-duty applications, such as steel mill auxiliary drives, cranes, hoists, shovels, coal and ore bridges, mine hoists, railway turntables, transfer tables, railway lift bridges, traffic bridges and conveyors, the Westinghouse Electric & Mfg.



Massive cast steel frames and rugged construction throughout adapt this motor especially for steel mill and other heavy service. High overload capacity is provided.

Co., East Pittsburgh, has developed, in cooperation with steel mill engineers the steel mill motor here pictured. The design of this motor embodies the latest recommendations of the Association of Iron and Steel Electrical Engineers.

The field coils and poles of the motor are positively secured to the frame without the necessity of washers or springs or other parts that might become loose and cause damage. Improved bearing housings are securely held from turning by a clamp on each side of the housings and accommodate, interchangeably, ball or roller bearings of any standard make for grease or oil lubrication. Deep commutator bars and wide risers permit many replacements, giving added years of commutator life. Laminated commutating poles prevent injurious sparking and give excellent performance, particularly in plugging and reversing. This construction permits high overload capacity without injury to commutator or brushes.

The motors have massive cast-steel

frames which are split horizontally, so the top half can readily be swung back without disconnecting any leads. The halves are hinged on self-supporting hinges on all frames, which makes convenient the removal of the armature bearings.

Operating and consulting engineers in charge of boiler plant and industrial furnace operation will be interested in the new bulletin which has recently been published by McLeod & Henry Co., Troy, N. Y., who have specialized in furnace refractories for 106 years. The bulletin describes the many different types of super-refractory blocks, bricks, and complete settings which are made of Carbox, the silicon-carbide refractory developed by that company. The physical characteristics and manufacturing processes of Carbox are described in detail, together with a complete explanation of its advantages, limitations, and the high-temperature applications for which it is adapted in lining boiler and industrial furnaces.

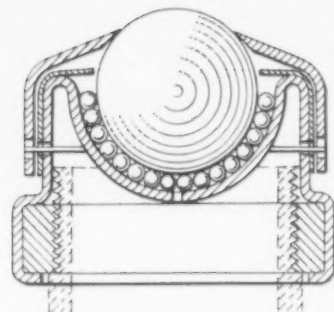
Ball Transfer for Handling Material

HANDLING equipment known as the Mathews ball transfer (Mathews Conveyor Co., Ellwood City, Pa.) is designed to accommodate the movement of any object having smooth hard surfaces, in any direction on a horizontal plane. Its application is not confined to any particular type of work or to any one industry.

This conveying device is made up with a large, hardened steel ball which rotates on a bed of smaller balls held in a cupped base. A dust-and-dirt cap rests on the ball, held in position by a spring retainer. Its knife-edge contact with the large ball deflects foreign substances which might clog the supporting balls if admitted to the base.

Two models are available, one for mounting on a table or flat surface support, and one for mounting on pipe supports. When mounted in groups on a heavy structural support, these ball transfers provide effective means of moving heavy shapes to and from shears, for conveying boxes to and from a line of roller or power conveyors, for handling heavy cores or molds—when these loads are placed on smooth bottom plates.

The ball table, as it might be termed when a group of the ball transfers is used, serves also as an efficient turntable for rotating heavy work in machining operations. When mounted on pipe supports, fixed in the floor in



TWO styles of ball transfer and cross-section through a third style, showing design. The section is Type 202; the floor mounting is Type 200; the pipe mounting (above) is Type 500, with load rating of 500 lb.

any desired arrangement, these transfers provide a bed on which large plates and similar materials can be moved.

Type 200 ball transfer is constructed with a 4-in. diameter round base, with four holes for mounting. Type 201 has a 3-in. square base with four holes for mounting. Type 202 has a threaded coupling base for 2-in. standard pipe. These three types have a load rating of 200 lb. each. Each is

equipped with a 1½-in. diameter hardened steel ball, supported on 105 3/16-in. diameter hardened steel balls, carried in a heavy hardened steel base.

Type 500 is similar to Type 202, but of heavier proportions throughout, with a load rating of 500 lb. The base is of drop forged steel, threaded for 2-in. standard pipe. A 2-in. diameter hardened steel ball is supported on 65 5/16-in. diameter hardened steel balls.



Mechanical Universal Car Loader

ACAR loader, designed to operate in conjunction with an existing wareroom loading crane and capable of locating loads up to 4 tons in any part of a standard box car, has been

developed and is being marketed by the Wean Engineering Co., Inc., Warren, Ohio, under exclusive licenses.

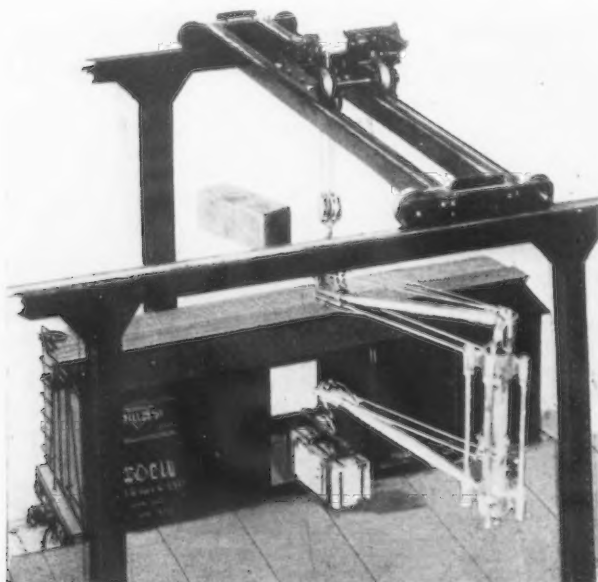
As designed, the machine is intended for use in conjunction with a 10-ton crane, the loader proper weighing approximately 6 tons when developed to support a 10-ton load. The machine is suspended from a standard

crane hook and may be disengaged in a few seconds when the crane is required for other service.

A novel feature of the design makes possible perfect balance of the loader proper, whether loaded or hanging free. This feature is accomplished by counterbalancing the loader itself, and by locating the load on the center of gravity of the crane hook.

By varying the type of loading grab hook used, any variety of material up to 4000 lb. can be spotted at any point within the box car area. The time required to load the average car will depend upon the material and the weight of each lift. In loading steel sheets, as illustrated, one crane-man and one hooker can, it is said, load a 50-ton car in less than 30 min.

Aside from the savings in time and labor made possible by the apparatus, an appreciable saving is effected also where sheets, or like material subject to scratching when handled singly, are loaded in strapped bundles.



LOADING a lift of crated steel sheets into a box car by use of a loader which can reach any part of the car's interior.



J. L. Lucas & Son, Inc., Bridgeport, Conn., machine tool rebuilders, has established its export department at 44 Whitehall Street, New York, under the direction of Pablo Homs, Inc., export manager.

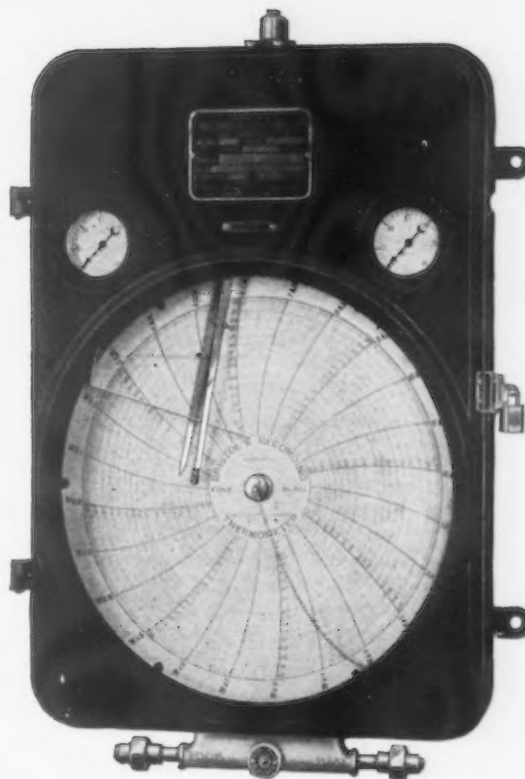
Free Vane Air-Operated Recorder Controller

NEW air-operated temperature or pressure recorders, employing a "free vane" as the initiator of control, have been placed on the market by the Bristol Co., Waterbury, Conn. Attached to and actuated by the measuring element, the free vane moves between two air jets placed opposite each other and having their stream lines coinciding. In passing into the air streams, the vane varies the amount of air which escapes from the jets, thus effecting control.

The two jets and the free vane are so arranged that the vane floats between two equal air streams at right angles to its motion, hence the position and movement of the measuring elements are not affected. The recording device is described as being free to reproduce temperature or pressure with complete accuracy. Use of the company's highly sensitive measuring systems is permitted by the frictionless controlling vane described above.

Component parts of the recorder are accessible. The point of control can be set to a visible scale by means of a key. Air at 15 lb. pressure is required for operation of the controlling mechanism. The instrument is inclosed in a two-part moisture-proof

ACTION of the control mechanism is initiated by a virtually frictionless vane between two air jets.



case made of cast aluminum and obtainable in wall or flush mounting types. It is furnished with inverted pen-arm and fountain pen as standard equipment. The chart is rotated by spring clock or Telechron motor. Either single-pen or two-pen types are obtainable, the latter being for com-

bination of pressure or temperature recording. The pressure range is up to 1500 lb. per sq. in.; temperature range, to 1000 deg. F., using 12-in. charts. The temperature measuring systems may be either vapor or gas filled, depending on the operating conditions to be encountered.

Small Air Compressors

ADDITIONS to the line of small single-acting air compressors made by the Sullivan Machinery Co., 400 North Michigan Avenue, Chicago, include models WL-1 flat belt and

V-belt driven and model WL-11 direct-connected motor driven units providing displacement ranges from 27 to 87 cu. ft. per min. and pressures up to 125 lb. per sq. in. Features include the use of heavy-duty ball bearings for crankshaft mounting, cylinder cast separate from frame, and cylinder head, containing inlet and discharge valves, attachable in any one of four horizontal positions for convenience in making piping connections.

Two and four-cylinder models WL-2 and WL-4 are similar to former models and can be arranged for V-belt drive with motor and compressor mounted on a subbase. Capacities range from 119 to 348 cu. ft. of free air a min. The four-cylinder units are of V-type with cylinders at 90 deg. and a common crankshaft having two cranks. The smaller cylinders of the four-cylinder compressors make for compactness and permit the use of light reciprocating parts, tending to reduce vibration.

All new models have "wafer" valves, "sweep control" unloading, water-cooled cylinders and heads, and automatic lubrication.

One of the improved compressors, the single-cylinder belt-driven model.



Vacuum-Cup Crane Handles Sheets, Etc.

A SUCTION crane for steel, non-ferrous and other flat materials where the surface must be preserved and breaks or buckles are to be avoided, or where a magnet crane is inconvenient or unsuitable, has been developed by United Engineering & Foundry Co., Pittsburgh.

Possible uses for the suction crane are almost unlimited. It is held to be ideal for thin sheets, high-finish sheets, tin plate, chromium-plated sheets, buffed copper sheets and polished stainless strips. It is applicable to paper, cardboard, fiber, wallboard, glass and lumber.

The crane is a self-contained unit, consisting of a series of suction cups, mounted in a bracket suspended from a boom or bridge or other crane construction. Vacuum is provided by a small motor-driven pump with air lines to the suction cups, the pump running continuously and the vacuum control being a two-way valve which either applies the vacuum or lets the air in for release. Lifting power is determined by the size and number of vacuum cups.

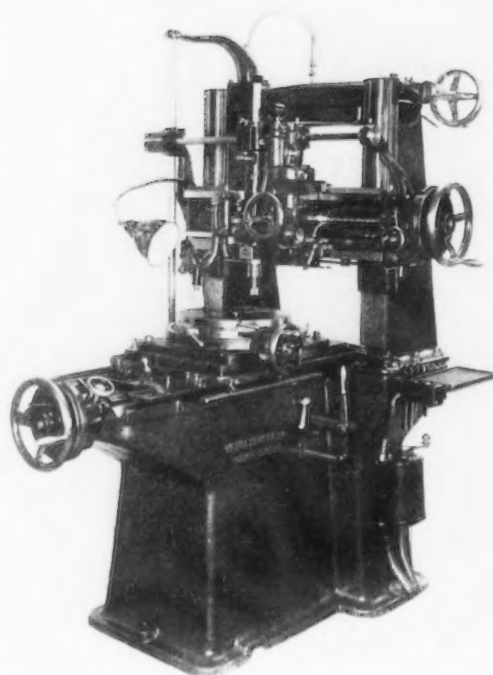
New Hauser Jig Borer

USE of a series of hardened and ground locating blocks fastened to the two upright housings to maintain accurate alinement between the cross-rail, spindle and table is a feature emphasized in connection with the new No. 3½ jig borer made by Henri Hauser, Ltd., Bienne, Switzerland, and marketed in the United States by the Index Machinery Corp., Cincinnati. Suitable arms attached to the cross-rail rest upon these blocks, thereby taking the weight from the lead-screws.

Errors remaining in the carefully lapped lead-screws are corrected by the use of long cams; this device is similar to that employed in other Hauser jig boring equipment built. A maximum error of 0.00025 in. is claimed for slide and table displacements or 0.0005 in. between any two holes. The universal circular table can be tilted by means of a worm operated by a handwheel. A graduated ring permits setting of the angle of tilt to within 1 min. of arc; table

rotation can be set to 5 sec. by another graduated ring.

The drilling spindle is bored to a No. 2 Morse taper. It has three reversible feeds and five cutting speeds; drive for the latter is through a clutch from a gearbox at the side of the machine. Spindle speeds range from 100 to 1500 r.p.m.; if a two-speed motor is employed, the number of spindle speeds is doubled. Specifications include: longitudinal travel of table, 24 in.; transverse travel, 16 in.; working surface, 24 x 16 in.; maximum distance between table and nose of spindle, 20 in.; maximum distance between vertical columns, 24 in.; diameter of circular table, 13¾ in.; maximum boring depth, 5½ in.; drilling capacity, 1 in.; boring capacity, 4 in. Floor space required is 66 x 57 in.



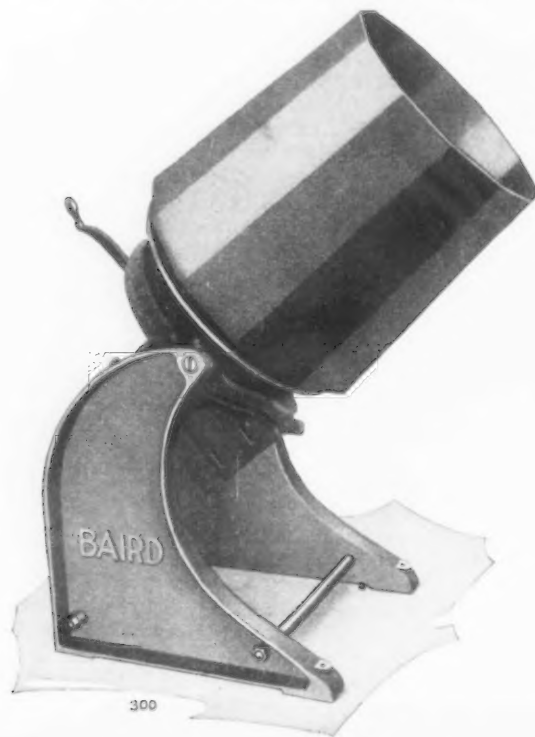
Oblique Tilting Tumbler with Motor Drive

COMPACTNESS, safety and small power requirements are features of the model A oblique tilting tumbler brought out by the Baird Machine Co., Bridgeport, Conn. Drive is by a fully-enclosed geared head ¾-hp. motor, mounted on the shaft support and geared directly to the barrel shaft which is ball bearing equipped. A plate secured to the barrel shaft is

arranged to carry one of the company's standard tumbling barrels. Standard barrel speeds range from 35 to 40 r.p.m.; others can be provided if necessary. The motor is equipped with overload breaker and snap switch.

Tilting for loading, unloading or setting the barrel to the angle best suited for the work is accomplished by means of a hand crank with worm and sector. The weight of the motor serves as a counterbalance, facilitating tilting. Floor space required with

Nos. 22 and 28 barrels is 28 x 48 in.; with No. 36 barrel, 36 x 48 in. Without barrel, the machine weighs 655 lb.; combined weight of barrel and load should not exceed 650 lb.



EQUIPPED with angle corner bottom barrel; other standard tumbler barrels can be used with this machine.

Chilled Roll of Electric Furnace Iron

A NEW heavy-duty chilled cast iron roll has been developed by the Krupp Works. It is a product of the electric furnace with a special alloy content, has a guaranteed Sclerescop hardness of 90 to 95, and is being supplied by Thomas Prosser & Son, 15 Gold Street, New York, American representatives of the Krupp Works since 1851.

Advantages claimed for the new roll, which is known as "Gwk 100," are as follows:

A close-grained and compact structure closely resembling a steel roll.

The roll surface may easily and economically be polished to a high finish, to produce the highest grade of finished surface on material rolled, such as highly finished sheets of aluminum, brass, nickel, etc. This roll is suitable for cold-finish rolling of sheets of the most varied metals and alloys, as well as for the manufacture of automobile body sheets.

Unusual depth of hardness; the penetration of the chill in the roll is not limited to the tempering zone, but reaches nearly to the core of the roll with only slight reduction in hardness.

Increased tensile strength. While the tensile strength of an ordinary chilled cast iron roll diminishes with increasing hardness, making the roll brittle and delicate, the new "Gwk 100" roll is said to overcome this, practically eliminating breakage. It is also not so sensitive to temperature changes and local overheating from slipping of the material being rolled.

Structural Steel Stabilization Plan Raises Issues as to Trust Laws

By L. W. MOFFETT

WASHINGTON, Nov. 17.—Neither the White House nor the Department of Justice has commented on the calls made at those places last Thursday by W. M. Wood, president of the Mississippi Valley Structural Steel Co., and director of the American Institute of Steel Construction. At the White House, Mr. Wood saw President Hoover and at the Department of Justice he talked with John Lord O'Brian, assistant to the attorney general, in charge of the anti-trust division.

Mr. Wood discussed the stabilization plan of the structural steel industry adopted at the annual convention at White Sulphur Springs, W. Va., Oct. 27-30, which was detailed in THE IRON AGE of Nov. 5, page 1188.

After leaving the White House, Mr. Wood gave out a statement outlining the proposal, which he described as a system of rationing structural steel business under a plan of "live and let live." It was pointed out that, by setting up a competent statistical organization, the industry can measure the capacities of the firms engaged in the industry and that each month a report on tonnage contracted would be issued.

It was explained that there would be no restraint on prices, bidding or territory. The plan would, it was stated, "restrain aggressive plants from vindictive bidding and wasteful competition because they will go after business with a full knowledge, based upon accurate statistical reports, on the conditions in the market."

Employment Insurance Fund Also a Feature of Proposal

Mr. Wood said that the directorate of the institute has been instructed to study the effects of the proposed plan and to recommend if it is possible under it to include an employment insurance fund for the benefit of the workmen engaged in the several hundred fabricating plants and erection gangs of the United States.

"If we are able to inaugurate such an employment insurance, it will be the first time that any branch of the construction industry has ever evolved a scheme of continuous work sufficiently stable to be judged insurable," said Mr. Wood.

The White Sulphur convention adopted resolutions seeking modification of the anti-trust laws so as to permit agreements in the industry tending to limit over-production,

which, it is held, would be necessary to effectuate the proposed plan of stabilization.

Liberalization of Anti-Trust Laws Sought by Some Industries

It is the view here that the proposal of the structural steel industry is further reflection of intensive efforts being made by the industries of the country to solve their many perplexing problems growing out of the depression. The situation has aroused stimulated moves looking toward relief through liberalization of the anti-trust laws, a subject of endless discussion ever since the Sherman act went on the statutes. The laws have been vigorously assailed as being archaic and entirely out of tune with modern business, including technical progress, mass production and related developments taking place since the law was enacted as a means of preventing monopoly.

On the other hand, the anti-trust laws have been defended aggressively as being necessary to the protection of the smaller industrial units and the public. It is likewise true that some important business interests do not look upon the laws as an unreasonable hindrance. Though stoutly challenged by those seeking modification, the contention is made that efficient business will survive under the laws and that the problem resolves itself into a matter of economics, responsive only to the natural law of supply and demand, involving good management, with resulting production at reasonable price and profit.

Again, there are business interests which maintain it would be much better to forego legislative requests for modification of the anti-trust laws and thus avoid Government interference, through regulation or otherwise. The problems, they insist, are beyond Congressional understanding. Those sharing this view contend that industry can solve its own problems best and that the master key lies in selling

at a legitimate profit. Ruinous competition through price cutting is pointed to frequently as being the greatest sore spot and one that could be removed by the industry simply by refusing to sell without profit. Those who take this position say the policy would not involve any agreements, either actual or implied, and therefore would not encroach upon the law.

At the same time many of those seeking modification of the anti-trust law concede this policy could safely be pursued, but explain that it is not possible to make it work because of an element in industry which feels or affects to feel that it involves danger of prosecution. With the law modified as desired, it is stated, this reason or "alibi," as it has been called, at least would be eliminated and business would be put to the actual test as to whether it would do away with unfair competition.

Attitude of New Congress on Subject Cannot Be Forecast

It is not possible to say what may be the attitude of the new Congress toward amending the anti-trust laws, but, judging the future by the past, it may be pointed out that Congress has traditionally been opposed to their liberalization. On the contrary, it has tightened them. Nevertheless, there is apparently a growing sympathetic attitude in this direction, at least as it relates to the raw-resources industries. It is these industries in particular, either on their own initiative, or through the Chamber of Commerce of the United States and other sources, which have urgently asked for early modification of the laws so as to permit agreements in order to balance production and consumption.

Some of the reports to this end detail plans to govern such agreements. An instance is that of the natural resources production department committee of the oil, coal and lumber industries of the National chamber, which suggests that in stabilizing these industries the plan be under the direction of a small Federal Government tribunal. The raw resources industries have met with considerable encouragement at the hands of the Hoover administration, and to a lesser degree at the hands of preceding administrations. This is seen in such organizations as the Oil Conservation Board, the Timber Conservation Board, and other set-ups, and latterly



by the recommendation made last week by Secretary of Commerce Lamont to the American Petroleum Institute, which proposed a coordination of State production by interstate compacts for the oil industry.

He said he believed Congress would approve such compacts for control of production, to put on a permanent basis the periodical forecasting of demand, to fix State production quotas and to enforce such quotas. This proposal, however, does not have any relation to amending the anti-trust laws, which many in the natural resources as in other industries so strongly urge is necessary.

The apparently greater encouragement given the natural resources industry is attributed to the fact that its products are irreplaceable and call for conservation to a greater degree than manufactures, though obviously manufacturing lines either directly or indirectly consume natural resources and therefore have a bearing on their conservation.

In his address before the last Congress, President Hoover suggested an inquiry as to the effect of the workings of the anti-trust laws on natural resources industries to determine if the evils of wasteful practices and destructive competition "can be remedied without sacrifice of the fundamental purposes of the law." Like views have been expressed by the President on subsequent occasions.

Position to Be Taken by the Administration Still in Doubt

But it remains to be seen what may be the attitude of either the administration or Congress toward general liberalization of the anti-trust laws for all industries, even assuming they are amended for the benefit of those engaged in producing natural resources. By some it is a question as to whether one class of industries could without discrimination be made the object of modified legislation.

It is certain that, whether later modified or not, the position of the Department of Justice as stated in an address by Attorney General Mitchell at Minneapolis on April 15 of the present year was anything but encouraging. Since this cabinet officer heads the department having charge of anti-trust laws, his remarks were interpreted as reflecting the administration view, though this has not been made clear.

In the course of his remarks, the Attorney General said that the "air is full of assertions that the anti-trust laws are antiquated and do not fit modern business conditions and they should be revised and amended, but rarely do we find any attempt at a constructive suggestion of a specific change or amendment which could be brought about and produce a satisfactory result."

Since this address, the raw-resources industries, the structural steel industry and other interests have proposed specific changes which they consider are constructive. But the

Attorney General has not stated his reaction toward them.

The Attorney General went on to say in his address, delivered before the Law School Association of the University of Minnesota, that combinations and agreements covering an entire industry and intended to restrict production have the direct purpose and will have the ultimate effect of raising prices. He declared that, if the combinations are to be permitted, he was unable to say how it could be done without forcing the Government into the business of fixing or regulating, or at least determining, the price to be charged. It has, of course, been declared by industries proposing plans that no combinations are proposed.

Interest in Stand President May Take in His Message

Because the subject has gained so much force there is a great deal of interest as to whether it will be dealt with in a specific manner by President Hoover in his forthcoming message to Congress.

The subject is one in which not only business but labor has shown much concern. It is widely known that, if modification of the anti-trust laws is sought by industries of the country, organized labor will immediately take advantage of the move to demand that Congress pass long-pending legislation which would either remove or greatly lessen the judicial power of injunction. This program of organized labor, as a matter of fact, may be the reason some business interests suggest that the anti-trust laws be left as they are and that the industries work out their own problems through research, trade associations and other channels which they have available.

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Scrap Movement by Rail Lower in First Half

Shipments of iron and steel scrap over the railroads of the United States during the first half of 1931 far exceeded those of pig iron, according to figures the Institute of Scrap Iron and Steel has compiled from records of the Interstate Commerce Commission.

The total movement of scrap in the six months was 86,205 cars, or 3,493,083 gross tons, while the pig iron movement was 35,353 cars, or 1,960,975 tons.

The scrap movement was 8 per cent higher in the second quarter of this year than in the first quarter—44,671 cars against 41,534 cars—but the scrap movement during the entire first half was about 40 per cent below that of the corresponding period in 1930, figures for which are 148,033 cars, or 5,865,682 tons.

The average freight revenue per ton of scrap for the first half of 1931 was \$2.01, against \$2.12 for the first half of 1930. The average per ton for pig iron was \$1.66.

Proposes to Enforce Fair Competition

Bills to make self-regulation in industry effective will be reintroduced in Congress by Senator Gerald P. Nye of North Dakota, according to statements made by him in an address before the Central Supply Association at Chicago Oct. 28. This proposed legislation would give legal sanction to trade practice rules, known as Group 2 regulations, which are now unenforceable.

"Industries generally have made rules and codes, but such rules are kept or discarded only to the extent that 100 per cent of the industry members find it agreeable to do so," declared Senator Nye. "Rules without some power to enforce them are ineffectual. The members of each industry for which a trade practice conference is held are, or should be considered, a voluntary association. And in the interest of the public and in fairness to honest business the law of the jungle should not be imposed by 10 per cent on 90 per cent."

"The highest possible authority as to the character of rules which are equitable in their administration, fair in their operation and necessary to the proper conduct of industry is industry itself. If a majority describe and denounce practices which, in their experience, are unfair or lead to unfairness, the minority it seems should be compelled to abide thereby, subject, of course, to challenge before the (Federal Trade) Commission and the courts"

"It would be too much to expect entire satisfaction in respect to rules laid down for industry by the commission. For this reason I expect to reintroduce my bills—one amending the Federal Trade act and the other providing for a Federal Trade Court with jurisdiction limited to the adjudication of trade matters."

"In case of substantial disagreements among business men over the commissioners' rules pertaining to business practices, the contending parties will have immediate access to the special tribunal for first instance at nominal expense of money and time, for going to trade concerns cannot afford the costs and delays of extended litigation."

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Sharp Drop in Output of Trackwork

Shipments of trackwork for T-rail track of 60-lb. and heavier dropped to 2162 net tons in October from 3472 tons in September. The decline has been continuous since the 8944 tons of March. The October total was about two-fifths as great as that in October, 1930, and about one-sixth as great as in October, 1929. It is by far the lowest figure ever reported for any month since this series was started.

Urge Tie-Up in Market and Product Research

THE development of new markets and new products and changes that have resulted during the period of depression, including the tendency toward increased economies in distribution and production, were discussed in a number of papers at an industrial marketing conference held by the American Management Association at the Hotel Statler, Cleveland, Nov. 11 and 12. A third day session was devoted to a northern Ohio export conference. All sessions were well attended.

"As business conditions change, companies may find that their territory divisions, division of customers among salesmen, sales expense, or even their customers themselves are no longer what they were in the past," Frederick B. Heitkamp, Cincinnati Milling Machine Co., said in a paper on "Product and Market Research." "Several firms which have made a study of these problems," he continued, "have found that conditions have not only changed materially during the depression, but that their previous set-ups are not adequate to meet the present situation. In looking forward to the period of expansion which will inevitably follow the present depression these firms realize that an entirely new type of set-up will be required and are at present making plans for the requisite changes."

"It is a common fallacy to believe that a market which has produced excellent sales in the past is capable of producing similar sales in the future. One manufacturer saved a great deal of future expense and effort by a study which revealed that he had already saturated his market."

Sell and Then Build

Probably the greatest opportunities for research lie in the direction of fitting the product to the needs of the consumer, according to the speaker. American manufacturers usually build and then sell, he said. The problem should be attacked in just the opposite way—sell and then build.

Methods of finding out what the customer wants were cited, the methods used and results obtained varying in character. Experiences of two manufacturers in bringing out new machine tools were mentioned. One developed a tool that resulted in a marked saving in the automotive industry, but the market was soon saturated and the manufacturer had failed to charge anything off for development. Another charged off for development and experimental work and sold 60 per cent of his output before the machine was built; when the mar-

Market Analysis by Salesmen, Engineering Service and Other Current Problems Reviewed at Marketing Conference—Export Matters Discussed.

ket was saturated he stopped making the machine.

"Something is lacking in market and in product research; the tie-up between the two is too vague," declared Robert F. Elder, professor of marketing, Massachusetts Institute of Technology, in the discussion. He found a tendency to bring out new products in a haphazard way. Sometimes the new product is too expensive or is such that the research and development expenses are not warranted.

Market Analysis for and by Salesmen

"Manufacturers must look ahead and by means of market analyses find what the market wants, what it will pay and how much it can use," declared D. M. Strickland, manager, development department, American Rolling Mill Co., Middletown, Ohio, in a talk on "Industrial Market Analysis for and by Salesmen." This information should be obtained before the introduction of goods, as well as in the case of a market already served. Overhead has been reduced by better management and better salesmanship, he pointed out, and it is no longer necessary for a plant to operate 85 per cent to show a profit.

Use of salesmen for making a market analysis with a view of adding a new product or broadening the present market has both advantages and disadvantages, according to the speaker. The advantages are speed, the men being already in the field, the sales force has the advantage of learning about the market first hand, thus gaining valuable information and making new contacts, the morale of the sales force is strengthened and the salesman is broadened, slack time is taken up in the sales organization and the prestige of the salesman is increased in the eyes of the buyer. Disadvantages include the loss of a salesman's time from his regular work, difficulty in securing cooperation of salesmen, particularly commission men, and the fact that a salesman is sometimes so close to the trade that he has a localized viewpoint and does not become neutral minded. Moreover, the buyer might be less inclined to give information to the salesman.

If the sales force has a strong central control from the home office, the salesmen will serve better as market analysts than if the sales organization is disjointed. Should the research require a very limited number of calls, it might be better to send special men from the home office.

A show of hands indicated that 21 used salesmen for making market analyses, the same number would use the same plan again, 14 would use a similar method for similar problems, 11 had used the home staff for making their surveys, and eight had employed outside research men.

Salesmen Trained for Intelligent Technical Discussion

The problem of handling engineering service as a part of industrial selling was analyzed by Raymond S. Perry, vice-president, Ingersoll Milling Machine Co., Rockford, Ill. Instead of using two salesmen, one a contact man and the other an engineer, Mr. Perry pointed out the advantages of developing representatives who would be trained primarily for sales functions with enough technical education or experience to enable them to handle a technical discussion intelligently. A salesman of this type would be carefully trained to recognize an opportunity for the application of his product in a customer's shop. He would put the customer's problem up to the engineering department without obligating it to any preconceived solution.

This method of sale, the speaker pointed out, makes possible the drawing of a line of demarcation between the salesman's responsibility and the engineer's responsibility. If the requirements laid down are met by the engineer, the salesman can logically be held responsible for the successful termination of the deal.

Vigorous Advertising Urged

"The best way to lick depression is by advertising, sales effort and new product," declared E. S. LaRose, assistant comptroller, Bausch & Lomb Optical Co., Rochester, N. Y., in a paper on "Industrial Marketing Research and Budgeting." He declared that through budget and research business is able to ascertain the market potential for the future. His company in common with modern business today lived and abided by the budget system. "The company which budgets," said Mr. LaRose, "on the basis that they know they are going to get the business and not on what they think they might sell is on a sound basis. Not only," he said, "has

it been found good business to use a budget in the industrial manufacturing business, but equally sound procedure to use a customer's budget, determining from statistics of the prospect's business the exact situation affecting the sale. A budget must take into account seasonal trends, current business conditions and competition. Budget breakdown in successful business must include a breakdown by trading centers, customers, types of equipment, domestic and foreign markets, sales districts and the different classifications of business involved."

A very complete budget system used by his company was outlined by Mr. LaRose. Sales for industrial uses are broken down into ten groups and each group is further broken down. Customer's sales rate records are kept by trades, States and alphabetically and the market is budgeted for each district. By budgeting the market his company has stabilized employment to an extent that there is a very slight variation between the peak and the low. Their latest accomplishment is a customer's budget which shows on what product sales are down and in what districts and what customers. Budgets show what lines are profitable, enabling the manufacturer to centralize on those lines. Budgets must be flexible.

Excellent Time to Consider Equipment Policies

"With the growth of mass production, the passing from a seller's to a buyer's market, our ideas of how business and manufacturing should be conducted have greatly changed," declared Dr. Dexter S. Kimball, dean of engineering, Cornell University, in an address on "The Interplay of Factory Equipment Modernization and Industrial Sales Stability." "Incidentally the introduction of a large number of scientifically trained men in all walks of industrial life has also had much to do with modern notions of industry. None of the new ideas that have been introduced into industrial management during the past 40 years is of greater importance than the need of definite, stable policies in the conduct of every branch of the business," declared the speaker. "A policy is a carefully considered plan of action based on the most accurate available knowledge of the market and with a given objective in view."

"The present appears to be an excellent time to consider equipment policies. If there is any feature of an industry that should be covered by a good policy it is the equipment, for the equipment is the capital investment and must be kept intact as to value if the industry is to survive or its loss in value due to time and wear must be accumulated elsewhere. An accurate equipment policy is an integral part of an accurate cost-finding system and no enterprise is safe that does not possess both."

The results of a questionnaire bear-

ing upon analysis of industrial markets were outlined by T. M. McNiece, manager of sales records and research, Union Carbide Co., and chairman of the association's industrial market research committee. The aim of the inquiry, the speaker said, was to point the way to better organization and coordination of effort in determining what is really needed and in developing agencies and methods for securing and using the acquired data. The answers to the questions indicated the following: A large percentage of companies have comparatively slight knowledge of total market and territorial demand for their class of product and the outstanding reason for this is a lack of information.

Published data are generally inadequate and should be supplemented by material gathered privately. There is a great preponderance of useful information published by Government bureaus, although many companies rely principally on trade association data and on publications. Data by counties were very generally requested, although many would be satisfied with data by States.

The speaker said there is much multiplication of effort among the four major sources of market information, United States Government bureaus, trade associations, trade publications and private research and that the work should be classified according to the data needed, method of securing the data, division of responsibility in collecting the data and promotion of usage of data.

Advertising Locates Individuals Responsible for Buying

That the individual rather than the company is the real sales prospect was the contention of Rudolph W. Staud, sales promotion manager, Benjamin Electric Mfg. Co., Des Plaines, Ill. Defining and locating the buyer and the buyer influence is the basis of all sales activity, he said. No company is the real customer. It is the men—one, two or more of them—in the company who are the customers and sales prospects and these real customers in industrial organizations today are changing faster than ever before. Selective selling is the keynote to reach these men. It is necessary to locate the right man or right men. In business today there are so many contacts to be made that a salesman must necessarily depend in large part on controlled advertising to enable him to reach his market. It is not the day of hunting smokestacks to find new accounts, but of finding the real buyer or buyers in the plant and in doing this advertising is playing a part of ever-increasing importance, he declared.

"Installment sales of industrial equipment are increasing," declared H. Bertram Lewis, vice-president, Commercial Credit Co., Baltimore, in a paper on installment selling of industrial equipment. The attraction of the installment plan of financing, he said, is that it permits industrial

equipment to pay for itself out of savings and earnings.

"Management is prone to error in three directions in determining price policies," declared C. S. Carney, vice-president, Trundle Engineering Co., Cleveland, in a discussion of industrial sales price policies. "These errors are failure to measure through market research the extent to which consumption will be affected by price change, failure to analyze costs, to determine what effect a price change will have upon profits, and failure to realize that there is seldom any relation between cost and selling price, the latter being determined by external forces. O. Fred Rost, McGraw-Hill Publishing Co., discussed whether sales should be made direct or through dealers or agents.

Two dinner meetings were held, one presided over by P. E. Bliss, president, Warner & Swasey Co., Cleveland, and the other by C. R. Cary, vice-president, Leeds & Northrup Co., who was in charge of the conference as vice-president in charge of the industrial marketing division of the association. The talks by Dean Kimball and Mr. McNiece followed the dinner meetings.

Engineering Service in Export Selling

American manufacturers were urged to look at European service in the light of their own American experience, in a paper at the Northern Ohio Export Conference, by C. R. Cary, on engineering service as applied to export selling. "If engineering service is unnecessary here, it probably will be unnecessary abroad," he said, "but if desirable here, it probably would be more desirable abroad." The speaker outlined what he regarded as an ideal set-up for an American organization which has sufficient volume to justify European service work. Under this set-up the American firm's agent in each foreign country would have one or more competent sales-service men so that there would always be one expert traveling through the various countries to back up the local men and carry factory prestige to the customer's plant. He would have at least two men for this work, so that they could alternately spend six months of service in the foreign field and six months at the American factory.

In a talk on personnel management in the foreign field, F. W. Copeland, vice-president, Sullivan Machinery Corp., said that so long as a foreign representative keeps within his limits of expense and investment and sells his quota, he should be given a free hand for all the duties of local administration. The main functions of the company's export manager at home should be to work with his company's executives in forming a clearly defined policy in carefully selected export markets, apply the policy in each territory, select the right men for the foreign posts and then back up the men with proper service.

Increasing Use of Welding Reported in Many Fields

New Applications Throughout Metal-Working Industries Noted
at International Acetylene Association Convention

GREATER inclination toward the adoption of welding in many fields was reported at the thirty-second annual convention of the International Acetylene Association at Chicago, Nov. 11 to 13. Even more marked than in previous years has been the trend during the past 12 months toward more freely accepting the oxy-acetylene process as a dependable major construction tool. This is evidenced in many ways; the vastly increasing mileage of welded pipe lines, the revision of the boiler code of the American Society of Mechanical Engineers, the appearance of welding as a definite selling point in advertisements of many types of metal products, and increasing interest on the part of engineering instructors, vocational schools and others.

Single-Purpose Torches Favored

Gas welding and cutting apparatus design is turning toward development of blowpipes or torches for a single type of work. Practically all new equipment of this kind is light in weight and large in capacity. The light aircraft-type blowpipe or torch has found considerable favor with manufacturers of sheet and tube products, saw welders and others outside the aeronautical industry. Large heating and welding torches have been developed for certain operations on steel plates and shapes, which require rapid heating to an extent that cannot be accomplished by ordinary welding torches. A new welding method which increases welding speeds 30 to 60 per cent makes pipe and plate welding a semi-automatic process and produces high quality welds at remarkable low cost. Another new development is the application of the cutting torch to the de-seaming or gouging of billets in steel mills, and strides have been made in the commercial production of mechanically gas-welded products in the stainless alloys and the acid resistance non-ferrous alloys.

Increased confidence in oxy-acetylene welded construction has resulted in more exacting demands being placed upon the welded joint. New minimum strengths are required of steel rods for pipe line, structural and pressure vessel welding. Recently developed high-test and strength and ductility-type welding rods have tensile strength up to 100,000 lb. per sq. in. Increased welding speeds have necessitated the development of new rods which meet new flame adjustment and accompanying welding technique. Today welding rods 5/16 in. diameter are successfully used in welding steel

from 3/16 in. thick to more than 1/2 in. thick.

Developments in Welding Rods for Alloys

Characteristics of welding rods for strong aluminum alloys are high strength, high resistance to corrosion, freedom from hot-shortness and a melting point lower than the base metal. Bronze welding of cast iron is gradually supplanting the fusion welding of cast iron in all applications which do not require the rigidity of the cast iron metal. A number of new applications of alloy cast-iron pipe have been introduced. Many of these are fabricated in the mill into double or triple lengths by bronze or cast iron welding, the field joints being made by bronze welding also. The use of bronze welding is becoming increasingly desirable also in applications to malleable iron. The bronze forms a bond with the malleable iron with the same facility as on cast iron and will, it is said, generally give very satisfactory results. Applications requiring rigidity in the weld and the ability to withstand heat stresses still call for the regulation cast iron welding.

It is generally being accepted by the industry that the aluminum-silicon rod containing 5 per cent aluminum and 95 per cent silicon is the most satisfactory rod for welding the heat treatable and alloy aluminum-base metals. The pure aluminum rod is still used extensively for welding the pure aluminum sheet. Generally speaking, the corrosion and heat resisting alloys depend for their special properties on a relatively high content of chromium, with other alloying elements to modify or improve the strength or the characteristics. However, the presence of the chromium is the principal point to be considered from the welding standpoint, as it is chromium which has the greatest effect on the flowing qualities of the metal during the welding process and on the properties of the completed weld. Practically all of the alloys

now on the market can be placed in one of six groups, and all of these alloys can be welded. However, welds made on some of these alloys require heat treating to remove the brittleness obtained next to the base metal. One group, which comprises the majority of the rustless steels now on the market, welds very satisfactorily, and the base metal and the weld metal are ductile after welding. This is because the composition of the base metal is such that no hardening due to heat treatment occurs. Such welds are even drawn cold very satisfactorily.

Cutting Torch Severs 72-in. Steel Risers

The limiting thickness of steel that may be cut has been gradually increased through the perfection of apparatus, until now steel slabs having thickness as great as 36 in. are being cut, and risers on castings with diameters up to 72 in. have been removed by the oxy-acetylene process. Difficulty has been encountered in satisfactorily cutting some of the chromium and nickel-chromium alloys which have recently come into use for resisting corrosion and high temperatures, the most familiar being known as the 18-8 alloy containing 18 per cent chromium and 8 per cent nickel. While all of these alloys can be cut by special procedures, results on the whole have not been entirely satisfactory except in specific cases where the smoothness of the cut was not of importance.

Cutting torches have been applied to considerably greater extent in the cutting to length of billets and the cutting to length of slabs, plates and structural shapes. De-seaming or billet gouging must be accomplished in a way that will not only completely remove the defect, but will also prepare the billet so that subsequent re-rolling will not start a new crack. This is done by removing the defective metal in a relatively wide, shallow trough, curving gently to the base metal and without sharp edges or depressions. With the torch, the metal is removed by rapid and complete oxidation. Oxy-acetylene de-seaming or billet gouging requires the use of considerable preheat and a large volume of oxygen at a medium pressure to attain the desired operating speed. In regular production, de-seaming speeds of 8 to 10 in. per sec., including starting time, are not unusual. The gas consumption, as measured by an hourly rate, appears high, but the operation, as measured by the work performed, is economically profitable.

In steel foundries the severing of risers is still the major activity from the oxy-acetylene viewpoint. The cutting of risers from chrome nickel and similar alloys has been accomplished. The welding of plain carbon-steel castings has been improved in technique and filler rod is available with the result that very satisfactory ac-

NEW OFFICERS

President: W. C. Keeley, Jr., National Carbide Corp., New York.

Vice-president: E. J. Hayden, Linde Air Products Co., Chicago.

Secretary: H. F. Reinhard, Union Carbide & Carbon Corp., New York.

Treasurer: W. E. Cotter, Union Carbide & Carbon Corp., New York.

complishments are being made with quality far in excess of that reached a few years ago. Some foundries are making a practice of casting a few pounds of filler rod of each new alloy they make so that they will then be able to repair welds with material that after welding will be closely akin to the parent metal.

Hard-Surfacing Welding Rod

During the past year the use of hard-facing in reclamation, repair and production has increased to a marked degree. The use of inserts of cast tungsten carbide for hard setting with subsequent hard facing has become increasingly prominent where resistance to the most severe kind of abrasion is required. The success obtained with the cast tungsten-carbide inserts has led to the development of a new type of hard-facing welding rod which consists of particles of crushed tungsten carbide sealed in a steel tube and contained in a matrix of hard facing material. Melting this rod causes the deposition of a uniform layer of extremely hard particles of crushed tungsten carbide, embedded in a base metal of tough, strong hard facing alloy. The backing-up metal, or type of steel upon which the hard surfacing is applied, is most important. Judgment dictates the use of steel of great hardness and lower ductility, so that the change of properties at the junction point of the facing material and the steel is not too extreme. Bit steel for hard facing is now specified having 0.40 to 0.50 per cent carbon and 0.60 to 0.90 per cent manganese. The preheating of heavy sections to be hard-surfaced and the annealing after the surface has been applied is recommended in order to get the best result as there is a decided change in the structure of the surface to be coated at the junction point. Preheating and annealing, as proved by tests, will restore more nearly normal conditions at the junction point. A preheat of 650 deg. F. and aircooling from 1550 deg. F. have been found to be the most satisfactory temperatures for these operations.

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Pig Iron, Steel Output in Canada at New Lows

Production of pig iron in Canada in September fell to 17,585 gross tons, the lowest monthly output since before the war, and comparing with 23,212 tons in August, this year, and 49,395 tons in September, 1930. For the nine months, production was 380,322 tons against 622,716 in 1930.

Output of steel ingots and direct steel castings at 33,390 tons for September was 36 per cent under the 52,491 tons reported for August and the lowest tonnage reported for any month since August, 1925. For the nine months, production totaled 592,855 tons, compared with 818,471 tons in 1930.

Spreads Employment by Cutting Hours of Regular Force

WITH the idea of giving employment to additional men, without cutting down plant efficiency or depriving regular employees of their work, the Youngstown Pressed Steel Co., Warren, Ohio, through its general superintendent, Robert M. Chesney, has developed a plan which has proved eminently successful since its inception on Sept. 6. It had been discovered that certain men in the plant were working more hours than what might be called a normal day or a normal week, and it was believed that if this extra work could be distributed among men who were totally unemployed the general situation at Warren would be improved.

Under the provisions of the plan all men in all departments, with one exception, were limited to 50 hr. a week. This one exception was limited to 60 hr. a week. When the plan was first put into effect the master mechanic, machine shop foreman, and storekeeper were excepted from the ruling, due to the fact that any restriction of their time would interfere with the productive efficiency of their departments. Since that time it has been found necessary also to make exceptions for five other men. With these few exceptions, however, the entire plant is now limited to 50 hr. of work per week. All new men hired were carefully checked, first as to their financial condition, second as to the number of dependents, third, the length of time they had been without work, the length of time they have lived in Warren, and, of course, as to their ability.

A check is made daily of the number of hours worked by all employees and a record is kept, so that when a man has worked 47 hr. his card is removed from the rack near the time clock and he is not allowed to work until the next week. He can work 50 hr. in any one week but no more. There are emergency cases, of course, where men are required to work slightly longer than the 50 hr., but when this is necessary the foreman must have the written approval of the general superintendent.

The plan has made it possible to increase the personnel 17 per cent without increasing costs. The new men needed were hired over a three-week period. No one department received more than five new men at any one time. They were brought into the organization gradually so that operations were not upset or disturbed. In most cases the new men were placed as helpers and in this way were not allowed to interfere with production.

The men who have been limited to 50 hr. seem to feel the fairness of

the move and have offered no objections. In fact the only comment heard from the men has been in favor of the idea, and the general attitude among the men seems to be one of approval. The comment most often heard is, "If everyone would do this same thing there would be fewer men out of work."

The plan was developed by Mr. Chesney because of the large number of entirely worthy cases that were coming to his attention. Good men with families were willing to work at any sort of labor that could be given them. The plan has been in effect long enough to prove satisfactory and will continue in force as long as there is an unemployment problem.

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Output of Steel Barrels Gained in September

WASHINGTON, Nov. 10.—Production of steel barrels in September rose to 451,562 units, representing 31.7 per cent of capacity, against 449,590, or 31.6 per cent of capacity, in August, according to reports received by the Bureau of the Census from 27 establishments.

Shipments declined to 452,960 from 455,502, while stocks at the end of September dropped to 37,294 from 38,692. Unfilled orders for delivery within 30 days decreased to 205,676 from 235,002. Unfilled orders for delivery beyond 30 days fell to 708,627 from 795,627.

Production in the first nine months of 1931 totaled 4,659,390 barrels, or 37.1 per cent of capacity, compared with 5,909,948, or 47.6 per cent of capacity, in nine months last year.

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A. O. Smith Corp. Wins Welding Patent Suit

A decree was recently entered in the Federal Court in Chicago, upholding the A. O. Smith Corp., Milwaukee, in its defense against the Morton automatic arc welding patents. The winning of the suit by the Smith corporation affects the entire welding industry and tends to free it from threatened injunction and royalty payments under these patents.

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Makes 7-Mile Wire Rope

LONDON, ENGLAND, Nov. 2.—A steel wire rope seven miles in length and weighing 63½ tons has been completed by the Whitecross Wire Co., Warrington, for use in the new Glasgow, Scotland, subway.

OFF THE ASSEMBLY LINE



Motor Car Production Lags While Makers Perfect New Models

Detroit, Nov. 16.

WITH only seven weeks remaining in 1930, the impression is growing that expansion of motor car output on a considerable scale will not materialize until after the turn of the year. There is little evidence at the moment pointing to a gain in production this month compared with last. Although assemblies in December are certain to show an increase over the current rate of operations, the betterment is likely to be of relatively mild proportions. In discussing what the industry may do in the coming weeks, one must remember that the Ford Motor Co. has been counted on to contribute in generous measure to an improvement during the final months of the year. Owing to delays at the Rouge plant, Ford's gain this month may be very little, if any.

It has been assumed for some time that the middle of November would mark the turning point in Ford activities, bringing a resumption of production following a long period of idleness and change-over from one model to another. This date has been reached with apparently considerable work to be done at Rouge before the new Fords begin coming off assembly lines at branch plants with regularity. It is now believed that Ford output will not attain any size until next month, probably not until near Dec. 15. This does not mean that nothing is being done, except experimentally, on the new car, as it is understood that certain departments at Rouge already are turning out parts. Moreover, it is said that a group of perhaps 1000 cars is being made leisurely as a test of the new production set-up; this work will be completed before regular operations on a production basis will be scheduled.

Ford Has Ordered Little Steel

Investigation shows that the Ford company actually has ordered less

Ford is not expected to put operations on a production basis until some time in December. Contrary to opinion, Ford has ordered little steel. It may make a steel "buy" this month for December delivery. The new model A probably will not be available to dealers until after the year-end.

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It now seems likely that Chevrolet, to be offered in December, will have free wheeling as well as synchro-mesh transmission.

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New Buick eight features automatic clutch control, ride control of shock absorbers and stream-lined body. Pierce-Arrow offers two 12-cylinder cars and an eight. Both Buick and Pierce-Arrow are priced lower than in past year.

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Automobile makers are guarding their 1932 plans carefully with few announcements anticipated prior to the January shows.

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steel than the trade was led to believe a few weeks ago. Some steel was placed with several mills subject to shipping releases at a later date, but the tonnage was not large. It now looks as though Ford will make a steel "buy" the latter part of this month for shipment in December. This may mark the resumption of monthly purchases which Ford makes while its plants are in operation. If earlier orders had been of the size that the trade thought them to be, a large purchase this month would not be needed. Ford parts suppliers are not expecting releases from the Ford com-

pany until about Dec. 1 or shortly thereafter. The new automobile frame plant of the Murray Corp. at Ecorse, which is likely to be a source of model A frames, will not be in production until Dec. 15. Ford makes approximately 50 per cent of its frames at Rouge, the remainder being purchased outside. Midland Steel Products Co. has been supplying much of this material and probably will continue to share in the business, despite the advantageous position which Murray is establishing for itself.

The Ford company is reported to have notified its dealers that new cars will not be available until after the first of the year. Men are being re-employed at Rouge at the rate of about 1000 a day. By the time that the new model A operations are running smoothly, the Rouge plant will have been idle, for all practical purposes, four to four-and-a-half months. This transition period has been short compared with the year required for the change-over from model T to model A. In view of the postponement of production at Rouge, it is believed unlikely that a schedule of 60,000 cars during the remainder of the year will be possible. It must be remembered that Ford has the task ahead of it of stocking its branch assembly plants with parts before assemblies begin.

Although assemblies of Chevrolet cars have not yet started on a production basis, parts are being manufactured in fairly large quantities at the various plants in this district. Steel releases have gone ahead regularly and the time is approaching when the company is expected to place orders for its second lot of cars. Perhaps this may come in November. It is said that free wheeling as well as synchro-mesh transmission will be a Chevrolet feature. It will be recalled that Chevrolet was the largest 1931 purchaser of machine tools, practically all of which have been installed in

the transmission plant at Toledo. Chevrolet will announce its new cars in December and will reveal its hand apparently before Mr. Ford gives his improved product to the public.

New Buick Attracts Attention

The new Buick, shown to the public for the first time on Saturday, is a distinct departure from previous models in its tendency toward streamlining, especially in the treatment of the front end. The sweep of the fenders, slanting windshield and absence of sun visor give the car a graceful appearance. Aside from the automatic clutch control, the easy ride control is an innovation of importance. It enables the driver to regulate shock absorbers according to the type of road on which he is traveling. Control of shock absorbers was first introduced by Packard last summer and is regular equipment on the new Pierce-Arrow announced last week. The wheelbase on Buick models 32-80 and 32-90 is 2 in. longer than last year. High compression is offered as optional equipment, Buick having developed a simple means of altering engines from standard to high compression by changing the cylinder head gasket and using spark plugs suitable for high compression. Among the advantages of high compression are a gain of three miles an hour in speed, increased mileage per gallon, faster acceleration, increased horsepower and speedier hill-climbing ability. A vacuum pump provides power for the windshield wiper so that it will continue to operate under all conditions. The straight-eight engine, with improvements, has been retained. In the new body construction all panels are welded together, except the rocker panels between the doors, which are left open to insure flexibility. All moldings are pressed directly into the metal, eliminating nailed moldings.

Many improvements have been made on the 32-50 series, placing it on a par with the larger cars. On the 118-in. wheelbase the company has added five new models and on the 114-in. wheelbase three models. The automatic clutch control, most radical departure of the year, is operated by power supplied by the vacuum in the intake manifold, always available when the engine is running. It is controlled by a touch of the foot on a floor button, making possible smooth gear shifting without use of the clutch pedal, with instantaneous change from free wheeling to conventional control and return. The conventional clutch pedal is retained, but is not needed to shift gears unless the driver desires it.

Companies Maintain Secrecy

Contrary to previous reports, it appears that the new Hudson and Essex lines may not be displayed until the January automobile shows. Aside from Stutz, Buick and Pierce-Arrow, already put on the market, Chevrolet

looms as the only major prospect for a showing prior to the end of the year. Most companies continue to maintain the greatest secrecy in preparing for 1932, but the fact has been confirmed that the main features will be improvements in transmission, trend toward streamlining of bodies and lower prices. The two cars announced in the past week, Buick and Pierce-Arrow, are selling at less than 1931 models.

The Pierce-Arrow has two 12-cylinder and one eight-cylinder cars in its new line. There are three wheelbases, 137, 142 and 147 in. Bore and stroke of the 12-cylinder engine on the series 53 chassis are $3\frac{1}{4} \times 4$ in. At 3200 r.p.m. the engine delivers 140 hp. Innovations on all of the new

cars include synchro-mesh transmission, free wheeling, ride control of shock absorbers, automatic starting device and non-shatterable glass throughout. The power plant is mounted in eight rubber blocks. The new braking system incorporates a composite brake drum made by Kelsey-Hayes Wheel Corp. The rim of the drum is a rolled section of No. 5140 S. A. E. steel. The side member of the drum is welded to this rim. The drums are larger, now being 16 in. The effect of the new brake is better braking action, no scoring and longer life. Other parts manufacturers have been experimenting for a number of months with a combination or composite brake drum similar to that developed by Kelsey-Hayes.

Water Movement of Scrap to Buffalo Increasing

The effect of the water movement of scrap on the future of the New Jersey market was discussed at a dinner meeting of the New Jersey chapter of the Institute of Scrap Iron and Steel at Elizabeth, N. J., Nov. 9. During the past few months there has been a heavy movement of scrap by barge from New Jersey to Buffalo and other consuming points, and it was pointed out at the meeting that were it not for this water movement, which opened up new markets, the condition of many dealers in New Jersey would have been critical, especially with eastern Pennsylvania markets restricted.

Benjamin Schwartz, director general, pictured the changed markets which will inevitably develop as the national waterway program is carried out and emphasized that the scrap dealers of the country must prepare to adjust themselves to new frontiers, as the result of water transportation.

Will Again Seek Embargo on Soviet Manganese Ore

WASHINGTON, Nov. 17.—Representative William Williamson, South Dakota, has announced that he intends to introduce a new bill in Congress along the lines of the bill he presented last winter providing for an embargo upon the importation of Russian manganese and other products. His plan was stated in a letter to President J. Carson Adkerson of the American Manganese Producers' Association. Mr. Williamson said a request will be made for an early hearing so as to give the Ways and Means Committee opportunity to study and report on the bill early in the session.

In sending out the letter of Representative Williamson, Mr. Adkerson issued a report to members of the association declaring that American

manganese producers will appeal to Congress for an early embargo on Soviet manganese ores.

Embargoes against Russia also are being sought through Treasury regulations covering a provision of the tariff act, effective Jan. 1, 1932, which prohibits importation of products produced by forced or indentured labor. The provision, however, exempts products which are not mined or made "in such quantities in the United States as to meet the consumptive demands of the United States."

Domestic manganese producers contend they are equipped adequately to supply requirements, both in volume and quality. They also maintain that Russian ore is produced by either convict or forced labor.

The steel industry has vigorously opposed an embargo on Russian manganese ore, and claims that the domestic ore does not meet quality standards.

Canadian Steel and Iron Output Low in 1930

WASHINGTON, Nov. 17.—Output of pig iron in Canada in 1930 was 747,178 gross tons and the steel output was 1,009,578 tons. The drop in pig iron was 332,982 tons, or 30.8 per cent, compared with the 1929 production. The decline in steel production was 368,446 tons, or 26.8 per cent. The drop in ferroalloy production was in exactly the same ratio as that of steel, 26.8 per cent, the output having been 65,223 tons.

Tariff Changes Requested

WASHINGTON, Nov. 17.—Request has been made of the Tariff Commission by the Diamond Chain & Mfg. Co., Indianapolis, for an increase in the existing duty of 40 per cent on bicycle chains. The Texas Mining & Smelting Co., Laredo, Tex., has asked for increased duties on antimony oxide and antimony regulus or metal, each of which is now dutiable at 2c. per lb.

PERSONALS

R. L. GRAY has been elevated to the presidency of the Sheffield Steel Corp., Kansas City, Mo., succeeding W. L. ALLEN, who has been made chairman of the board, a newly created position. The Sheffield Steel Corp. was absorbed last year by the American Rolling Mill Co., through an exchange of stock. Mr. Gray has been affiliated with Mr. Allen in business since 1923. He was with the Laclede Steel Co. before he became vice-president of the Kansas City Bolt & Nut Co., the predecessor of Sheffield Steel Corp.

A. CRESSY MORRISON, whose services as secretary-treasurer of the International Acetylene Association for the past 25 years have been of incalculable value to the acetylene industry, is a recipient this year of the 1930 Morehead medal, which is given to the person or persons who in the judgment of the officers and board of directors of the association has done most to advance the industry or the art of producing or utilizing calcium carbide or its derivatives. Mr. Morrison, one of the pioneers of this organization and of the acetylene industry, has devoted a large portion of his life and a major portion of his efforts to leadership in this field.

H. N. EDENS has resigned as secretary and treasurer, John Lauson Mfg. Co., New Holstein, Wis., manufacturer of farm and road tractors and gasoline engines, to become associated as general manager with the Kiel Machine Co., Kiel, Wis., manufacturer of gas, oil and water well drilling machinery.

WILLIAM H. JACOBI, formerly general manager of the Keokuk Steel Casting Co., Keokuk, Iowa, subsidiary of the Springfield Boiler Co., Springfield, Ill., is now affiliated with the Continental Roll & Steel Foundry Co., East Chicago, Ind., in the capacity of sales engineer, specializing in cast steel pressure vessels and fittings of all kinds, both rough and finished.

DONALD J. REESE, metallurgical engineer, Whiting Corp., Harvey, Ill., addressed the monthly meeting of the Pittsburgh Foundrymen's Association held on Nov. 16, his subject being, "The Making of High-Test and Alloy Gray Iron in the Brackelsberg Furnace."

DONALD M. SCOTT has resigned as vice-president of the Gould Coupler Co., Depew, N. Y., and of the Symington Co., Rochester, to devote full time to the affairs of the Buffalo

Electric Furnace Co., of which he has been elected vice-president. T. HOLLAND NELSON, of the Midvale Steel Co., Nicetown, Philadelphia, and GILBERT E. SEIL, of E. J. Lavino & Co., Philadelphia, have been added to the engineering staff of the Electric Furnace company.

EVERETT CHAPMAN, director of engineering and research, Lukenweld, Inc., a division of Lukens Steel Co., Coatesville, Pa., is to discuss the principles of design involved in producing welded structures at a joint meeting of the New Haven chapter of the American Society for Steel Treating and of the Bridgeport chap-

HONORED FOR SERVICE TO MECHANICAL ENGINEERS



IN recognition of outstanding service, Dr. Calvin W. Rice, who for 25 years has been secretary of the American Society of Mechanical Engineers, has been elected to honorary membership in the A.S.M.E. The honor will be formally bestowed at the annual dinner of the society to be held at the Hotel Astor, New York, on the evening of Dec. 2.

The substantial achievements of Dr. Rice, whose devotion to the ideal of a united profession which should take important leadership in advancement of education and research, in the promotion of industry and in furthering public service, is well known, will be set forth at the dinner by Dr. Karl T. Compton, president, Massachusetts Institute of Technology, and by others.

ter of the American Society of Mechanical Engineers, Nov. 19, at the Barnum Hotel, Bridgeport, Conn.

HUGO CZERWONKY, formerly a salesman in the Chicago territory for the Kearney & Trecker Corp., Milwaukee, has been appointed advertising manager to succeed C. M. CHEADLE, who has resigned to become associated with Scott & Fetzer, Milwaukee, State distributor of sanitation systems.

ALLSTON DANA, engineer of design of the Port of New York Authority, gave an illustrated address on the design and construction of the George Washington Bridge before the Hartford, Conn., section of the American Society of Mechanical Engineers on Nov. 12.

SAMUEL L. HASTINGS, chairman of the finance committee, Dayton Scale Co., Chicago, has been nominated for president of the Illinois Manufacturers' Association for 1932. Mr. Hastings was president of the scale company for 25 years and assumed his present post after its merger in the International Business Machines Corp.

OBITUARY

ANSON MARK, vice-president, Clayton Mark & Co., Chicago, died in that city on Nov. 12, aged 64 years. He had been in the steel manufacturing business in Chicago since 1890.

A. L. CULBERTSON, since 1927 manager of the furnace division of the Rust Engineering Co., Pittsburgh, died at his home in that city on Nov. 15. He was born at Mt. Vernon, Ohio, in 1895, and attended Ohio State University and Cornell University, having been graduated from the latter institution. Following service in the war, he became identified with the Chapman Engineering Co., Mt. Vernon, Ohio, and from 1921 to 1927 he had served as vice-president and assistant general manager of that company and its affiliate, the Chapman Stein Furnace Co.

A 32-in. cold rolled and hardened steel belt was illustrated in THE IRON AGE of July 16, page 187. It was made by the Sandvik Steel Works, Sweden, on a cold-rolling mill built by Fried. Krupp Grusonwerk, A. G.

Electric Hoist Manufacturers' Association reports that the number of hoists ordered during October increased 29 per cent, as compared with the previous month, and the value of such orders increased 7.9 per cent.

Home Construction May Be Stimulated by Hoover Plan

Program of Regional Banks to Handle Frozen Real Estate Paper
Might Release \$1,800,000,000 for Building

WASHINGTON, Nov. 17.—Encouragement of home ownership through legislation at the coming session of Congress will be made by President Hoover. The plan will be directed toward financial and tax relief, as was detailed in a statement announced last Saturday by the President, and calls for the establishment of a new national system of home loan discount banks. Plans to lighten taxation through partial or complete tax exemption of improvements in real property were announced by a committee on taxation appointed by the President. This committee will make a recommendation to this end to the President's Conference on Home Building and Home Ownership when it meets in Washington, Dec. 2-5.

The comprehensive program outlined by the President calls for the setting up of a home loan discount bank in each of the 12 Federal Reserve districts to provide a service for the small home investor similar to that given the commercial field by the Federal Reserve system of rediscounting paper. The purpose is to give fluidity to frozen real estate paper and to prevent enforced liquidation of farm and home mortgages. It is estimated that the plan would release approximately \$1,800,000,000 in new construction funds.

Home Building Would Be Stimulated

By doing this, it is believed that home building will be stimulated through reduction of costs of financing and that the system of construction mortgages of the country will be adapted to modern business. The significance of this is seen in the estimate that home mortgage loans in the United States amount to approximately \$25,000,000,000.

Broadly, the home loan discount bank chain would operate in its field as the Federal Reserve system does in its field. Each bank would have a capital of something between \$5,000,000 and \$30,000,000, depending upon the needs of the community. Private stock subscriptions would provide the initial capital and unbalanced margins would be supplied through temporary advances by the Federal Government.

The relief from taxation has been suggested because the taxation committee, headed by Prof. Thomas S. Adams of Yale University, reports that it has found that "the concentration of the heavy property tax upon real estate discourages and materially restricts home ownership."

Another report condemns congestion of population and consequently of

housing as not only socially undesirable, but tremendously expensive in indirect costs to industry as well. These reports come from a group of manufacturers and technical experts who form the committee on industrial decentralization and housing of the President's Conference. The committee is headed by Stuart W. Cramer of Cramerton Mills, Cramerton, N. C. Among the members is George M. Verity, chairman of the American Rolling Mill Co., Middletown, Ohio. The committee will recommend to the President's Conference a number of steps which, it is pointed out, "should lead to a determination of the complex economic forces at work in the movement of population and industry in order that they might be directed in the interests of a more desirable distribution of our people."

The committee explains that many leaders of housing have pointed to housing congestion as a menace to the industrial prosperity of the city.

Concerning industrial housing, the committee has analyzed the causes that have actuated business concerns to engage in housing activities.

"The most successful cases of movement of industry appear to have been where manufacturers have had sufficient capital to build dwellings for their work people," the committee states. It cites examples of carefully planned industrial village communities which possess such desirable characteristics as good homes in close proximity to places of work. Two studies made by the committee are designed to throw light on what present tendencies in the movement of both population and plants are. The results of these studies will be given to the President's Conference when it meets here next month.

Construction Awards in October Below 1930

Construction contracts awarded during October, according to the F. W. Dodge Corp., amounted to \$242,094,200 in the 37 States east of the Rockies, or 28 per cent under October, 1930. Non-residential building led the three major construction classes with \$99,092,400. This was followed by public works and utilities with \$82,461,700; and residential building with \$60,540,100.

Two of the 13 districts covered by the Dodge report produced October gains in dollar contracts over that

month of last year. Non-residential building contracts in the metropolitan New York area, with a gain of \$22,000,000 over October, 1930, put the month's total for that district 12 per cent ahead. This gain was accounted for by the letting of contracts for three units of the Radio City project. The Middle Atlantic territory showed a \$23,000,000 gain in public works and utilities projects, or a 31 per cent total gain over October of last year.

Comparison of the month with September records show advances in the New England, metropolitan New York and Middle Atlantic territories. In the first named the month's total of \$25,362,800 was ahead of September's \$22,989,000. In the metropolitan New York area, \$89,518,600 compared with \$67,483,500 in September. The Middle Atlantic district's \$42,460,300 in October compared with \$27,635,500 for September.

Salvages \$16,000 a Year from Ashes

Savings of approximately \$16,000 a year are realized from salvaging metals from ashes produced in the scrap incinerator at the Schenectady plant of the General Electric Co.

The ashes, instead of being loaded into a dump car and delivered to the dump, are first run through a ball mill, where they are pulverized, the larger pieces of metal passing out of the mill and over a magnetic separator. This separates the magnetic scrap from the non-magnetic material, which consists of copper, brass, aluminum, etc.

The finer material which is discharged from the ball mill passes over an inclined, longitudinally grooved "concentrating table," which has a stream of water flowing crosswise of the material.

The metal, being heavier than the ash, slides down the bottoms of the grooves and falls off the lower end of the table, while the ash is washed off the side of the table and is then pumped through a "dewatering cone" which discharges the dewatered ash in a dump car. The ash is used for filling in low ground and the metals and concentrates are melted or sold.

By this method approximately 100,000 lb. of ashes are ground and washed and from 20,000 to 25,000 lb. of metals and high-grade smelting material is recovered each month.

Truscon Steel Co. Buys Berger Mfg. Co. Unit

Truscon Steel Co., Youngstown, has acquired the building material division of Berger Mfg. Co., Canton, a subsidiary of Republic Steel Corp., the transfer to become effective Dec. 1.

Steel Industry Not Yet in Equilibrium

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

AVERAGE daily steel production declined slightly in October. As steel production normally increases about 3.3 per cent to its fall peak in that month, our adjusted index fell. It is now 36.7 per cent of "normal," against 38.2 per cent in September and 64.2 per cent a year ago.

Unfilled orders of the Steel Corp., also, showed an unseasonable decline, and at the end of October were only 76.1 per cent of their 1923-1927 average. This is the lowest since June, 1927. The index compares with 78.5 per cent in September and 85 per cent a year ago. Almost always there is a strong, seasonal gain in unfilled orders in October and the decline last month is distinctly unfavorable.

Since the average daily production decreased and shipments were presumably low, it means a reduced volume of new business. Moreover, the rate of change in the unfilled orders index, one of our best business barometers, indicated a somewhat greater downward trend than in the preceding month.

The average price of finished steel remained unchanged for the third successive month, at 83.8 per cent of the average for 1923-1927.

Pig iron production declined a little more rapidly than steel production. Usually there is a seasonal increase of over 2 per cent in October. Our adjusted index has fallen to 39.4 per cent of "normal," which compares with 41.4 per cent in September and 73.2 per cent a year ago. That equilibrium has not yet been restored is indicated by the further decline in pig iron prices. THE IRON AGE composite, averaged for October, fell to 70.9 per cent of the average for 1923-1927.

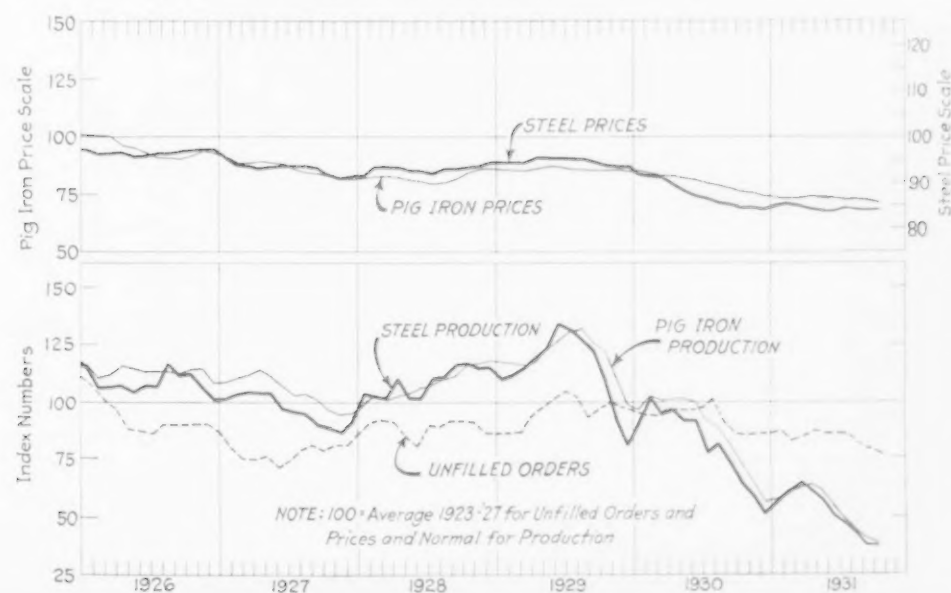
Thus, for about six months outputs of pig iron and steel ingots, unfilled orders and pig iron prices have declined, while the average price of finished

steel stands almost exactly where it did last May.

The recent decline in pig iron confirms the reasoning based on the relative levels of steel production and pig iron production. The latter seems too large to allow anything but price weakness, in view of the small demand for steel-making purposes. Building activity is so backward that the general demand for radiators, boilers and sanitary enameled ware can afford little help. Compared with finished steel and steel scrap, pig iron is still "dear." Weakness is, therefore, probable until a sharp increase in steel production occurs, which is improbable before January.

There is yet no sign of a real turn for the better in general business conditions and, therefore, it is difficult to see any hopes of early improvement in the general demand for steel. The very backward conditions prevailing during most of the fall season appear to have left a little resistance to the year-end seasonal decline, and "sentiment" has been encouraged by spurts in certain speculative commodity markets. These may bring some increase in inquiries, but there are neither the shortages of commodities nor the confidence in financial conditions which would bring a follow-through on a rising trend.

Too much frozen credit still exists to allow an early recovery in business. Too many people cannot buy because they are carrying past commitments or debts. The banks are still heavily loaded with investments in securities and loans on securities—a condition hardly calculated to support sound credit expansion. The new credit agencies being established merely change the form of the credits or the method of holding them, and are at best mere palliatives. They warrant some fear, moreover, that an inflationary expansion of credit may be developed.



BOTH pig iron production and steel output failed to make the seasonal gain in October. Unfilled orders of the Steel Corporation receded, also. And pig iron prices dropped further, indicating too high production, compared with steel.

The Iron Age, November 19, 1931—1325

(ESTABLISHED 1855)

Sentiment and Trade

ACCORDING to the judgment of the financial editor of the *New York Evening Post*, bad news coming out last week predominated over good news, after a period of a fortnight in which good news predominated, while "in addition, the period was characterized by several general survey stories of a very optimistic tone." The question is then raised, but naturally not precisely answered, how the public is going to react to the showing business is to make in future, for there cannot be any sharp or rapid improvement.

Just to test the matter of what the concrete business news is, we selected from the Department of Commerce table of "weekly business indicators" three items, comparing their changes in a period of three weeks with their changes during the same period three years earlier, i.e., in 1928 when business was moving in ordinary fashion. The comparison as far as it goes eliminates seasonal variation. The figures come out that freight car loadings improved by 4.4 per cent, bituminous coal production by 3.4 per cent and bank debits outside New York City by 13.7 per cent, in three recent weeks compared with 1928 swings.

The figures cited are not conclusive. Coal production fluctuates irregularly, including a new element now, for householders very largely have been buying from hand to mouth this year instead of laying in a large stock early. In 1928 freight car loadings reached a seasonal peak in the week of Sept. 26 and then had a large seasonal decrease; the recent movement accordingly makes an apparently favorable comparison. As to bank debits, they have, curiously enough, a habit of jumping up and down and only comprehensive comparisons are trustworthy and informing.

Some well-poised observers have insisted that when business improvement should come, it would not be recognized for some time. After such bad times it would take a great deal to impress people favorably, following so many false prophecies of "improvement around the corner."

It is easy to say, and it is being said, that recovery will be aided if men take a more hopeful view of the nearby future than they have been taking of late. The question is whether men at large will be more hopeful. One cannot judge by public utterances of a favorable character, for they may not widely be believed.

There is much statistical information as to what occurred during the depressions of the eighteen-nineties and the eighteen-seventies, but relatively little record of what men were actually thinking.

A historian of the eighteen-seventies depression, however, said "people woke up one morning in September, 1879, to find the country prosperous." It appears that in the depression of the eighteen-nineties people got so used to the condition that they hardly looked for anything else. In the later portion of that depression there was little unemployment while there were almost no earnings, but there was activity. Thus a suggestion is furnished that there may be much increase in trade activity without people feeling that they are emerging. Perhaps there is little occasion to endeavor to measure "sentiment."

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Economic Law or Economic Disease?

WRITING in the *New York American*, Henry Morgenthau voices his opposition to any broadening of the range of bank loans eligible for rediscount by the Federal Reserve Banks. "The proposal to relax the rediscount provisions of the Federal Reserve Act," the *New York* financier declares, "is only another attempt at stepping in between offenders against the laws of economics and their punishment." He deplores the frantic effort of millions to save "bad debts" by throwing good money after bad and adds that "it will be far healthier for the nation if these individuals, corporations and banks which have offended against economic laws are forced to take their losses."

It is remarkable how glibly financiers speak of economic law as if it were something immutable like a law of nature. Mr. Morgenthau admits that the greatest of all measures "governing economic matters ever put upon the American statute books was the Federal Reserve Act." He does not, however, remind the reader that the passage of this beneficent act was forced through Congress in the face of the almost unanimous opposition of American bankers. Nor does he explain why our economy was ameliorated when the Reserve System superseded what he himself characterizes as "the archaic system of national banks." Is it possible that "economic law" was changed?

Of course, most business men have long since learned that the operations of the law of supply and demand are conditioned by the myriad of forces, material and psychological, that make up the complex of modern life. They need not be told that pre-panic inflation was excessive. Where they differ with Mr. Morgenthau is in their interpretation of deflation. He sees deflation as a manifestation of economic law. They recognize it as a virulent economic disease. They are well aware that the descending spiral of deflation begetting deflation has as little relation

to real values as the ascending spiral of inflation breeding inflation. They know that the world-wide financial crisis destroyed confidence and dried up credit, creating an abnormal condition in which prices became fictitious.

It is one thing to be governed by variations in supply and demand and another to fall victim to a contagion of fear which paralyzes trade. If the Federal Reserve Act provided partial protection from the ravages of such economic epidemics, possibly even greater immunity will come from well-considered amendments of that statute. It is time to talk less about economic law and more about economic disease.

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Uncalled-for Crêpe Hanging

NO little interest attaches in the field of business to recently developed prospects that our population will increase much less rapidly than in the past and may even reach a stationary point, but there is no call for the crêpe hanging which has been indulged in concerning this prospect. Such reveling in a blue funk is an apt illustration of an all too prevalent disposition to view everything in the worst light, except for the shedders of optimism, whom nobody believes. When times were good the prospect of slower population growth was looked upon favorably except by some industrialists years ago who were afraid there would not be enough "hands."

The statistical facts may be reviewed very briefly. Making adjustments for changes of date in the decennial census, in the half century to 1890 population increased an average of 30 per cent per decade; 1890 to 1900, 20.7 per cent; 1900 to 1910, 21.3 per cent; 1910 to 1920, 15.4 per cent; 1920 to 1930, 15.7 per cent. Thus 20 years ago we appeared to have established a rate of increase of about 21 per cent per decade, and the rate has since dropped, while it is dropping more at present.

Some of the crêpe hanging proceeds along the line that we ought to do something for posterity, try to encourage population in certain ways, although there is a traditional Irish exclamation in Parliament: "What has posterity ever done for us!"

A curious argument is that as this thing keeps up the old people will constitute a larger proportion of the population than at present, hence there will be an increased "burden" for which provision ought to be made, but surely the principle begins working, and more strongly, with the very young by decreasing their number. The family as a whole can live better if there is a smaller proportion of youthful dependents.

Viewing the population as a whole the country certainly grows better off per capita if population increases less rapidly. Facilities will be available to a greater percentage of the population. Wealth should have wider distribution. Individuals will be better off. The Malthusian doctrine was a very hard one and we should consider ourselves very fortunate to escape completely from its application.

Of course industries and utilities must take the matter into account in their planning. If they are stupid enough not to do so it will be unfortunate, but it is putting the cart before the horse to intimate that there is danger in our population not living up to plans. Let the plans take care of themselves.

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The Wealth of Women

IN a recent contribution to the *Annalist*, Dr. W. R. Ingalls estimated the wealth of the American people in 1929 at about 450 billion dollars, plus about 10 billion net in foreign investments, exclusive of the governmental debts that are owed to us.

Of the internal wealth by far the greater part is in real estate, and of it the greater part is in the farms and dwellings of the people. The aggregate of the corporate wealth, which of course includes real estate to more or less extent, is estimated at about 150 billion, about 80 per cent of which is represented by stocks and 20 per cent by bonds.

In the November issue of the *Atlantic Monthly*, Albert J. Nock declares that women now own and control more than 40 per cent of the wealth in the United States, and the editors of the magazine add the note that they have made independent investigations and are convinced that the findings of Mr. Nock are conservative. Probably they are neither conservative nor true, which the correlation of 40 per cent with 450 billion dollars would indicate.

What is meant by Mr. Nock and the *Atlantic Monthly* is that the stocks and bonds of corporations are largely owned by women, to whom they have accrued as beneficiaries of life insurance, by bequest and otherwise. Specific data in respect to the American Telephone & Telegraph Co. reveals that the majority of its stock is owned by women, and the records of some other large corporations show a similar position. It is going far, however, to assume that 40 per cent of all the corporate stock is so owned.

But even as things are there is a condition that is a proper subject for reflection. When the stock of a corporation becomes so widely dispersed that there remains no concentrated interest imbued with a spirit of partnership, the control of the corporation passes into the hands of a managerial group possessing but relatively little ownership. This may be immaterial in respect to some of our greatest corporations that in this way change from a partnership character into an institutional character, and as such are administered sincerely in the interest of their multitudinous stockholders and also of the public. The American Telephone & Telegraph Co. is a conspicuous example of this. There are, on the other hand, many corporations that become the playthings of selfish groups, for the reason that their stockholders are too diffused to take an interest in them and to concentrate their power. Such corporations change from the partnership character to the political. For this reason there are many investors who prefer to be stockholders in a corporation in which there is a concentrated interest.

Pressure to Reduce Costs to Increase in 1932, Says Col. Ayres

Appreciable Price Recovery Unlikely, He Tells Economic Society
—Other Speakers Offer Divergent Views

INTENSE pressure to reduce costs will characterize 1932 and succeeding years, in the opinion of Col. Leonard P. Ayres, vice-president, Cleveland Trust Co., Cleveland, who was an after-dinner speaker at the fourth annual meeting of the Harvard Economic Society, held at Boston, Nov. 13 and 14. The calamitous drop of wholesale prices is the major force in this depression, he said, and costs will have to be pared to fit prices. The relatively greater deflation of agricultural prices suggests further downward readjustment of industrial wages and salaries, although part of the reduction in costs may be effected by the introduction of better methods and more efficient equipment.

Colonel Ayres sees no symptoms that would make for a reversal of the downward price trend. Important declines in commodity prices tend to be durable. On the other hand, credit strains tend to be temporary in their destructive effects, he asserted. Expansion of currency in circulation as a means of raising prices would be feasible, in his opinion, only in an economically isolated country.

Pro and Con on Managed Currency

Somewhat different views were presented by Dr. Wallace B. Donham, dean of the Graduate School of Business Administration, Harvard University, and Prof. J. Franklin Ebersole, Harvard Economic Society. The gold standard, as formerly understood, has not existed since the war, according to Professor Ebersole. In every country there has been a scramble to build up central bank reserves and this tendency is becoming more pronounced in view of difficulties growing out of the recent financial crisis. The world, he said, is witnessing an interesting laboratory experiment in managed currency. Developments to date at least have shown that managed currency in a single country is no proof against falling prices and is just as unlikely to be proof against rising prices.

Dean Donham holds the view that monetary and banking policy can influence the course of prices and he feels that social security demands that prices be raised. The saddest feature of the collapse of prices, in his eyes, is that it threatens the stability of our whole middle class. There is much talk, he pointed out, about reducing wages to bring them into balance with prices, but it would be infinitely better to obtain that equilibrium by raising prices to a parity with wages. Wage deflation, he feels,

would involve years, possibly decades, of discord, strife, instability, with the ever-present danger of insurrections and wars the world over.

Return to Individualism in Banking

A country controlling so large a proportion of the world's gold and the world's production and trade as the United States can exert a powerful influence on the trend of world prices, in his belief. He feels that Federal Reserve credit has not been sufficiently expanded and cites the measures taken in 1921 as indicative of what should be done now. Gold and gold certificates in circulation, now amounting to \$1,400,000,000, should be withdrawn and replaced with Federal Reserve notes, in his view. In addition, he believes that Federal Reserve banks should buy Government securities in larger volume as a means of expanding credit.

Dean Donham also is convinced that the Federal Reserve Act should be amended. Borrowing habits in industrial areas have changed so radically that the banks serving them have very little paper eligible for rediscount at the Reserve banks. Statistics published a year ago indicated that 43 per cent of the banks in the Boston, New York, Philadelphia and Cleveland Federal Reserve districts had less than 10 per cent of their total assets eligible to rediscount. The result is that our banking system has returned to sheer individualism. Big banks are relying on themselves, so far as reserves are concerned, and smaller banks are tying up with big ones. In a word, the Federal Reserve system has got out of touch with many of the communities it was intended to serve.

International Restrictions on Federal Reserve Policy

The real reason why the Federal Reserve banks have not taken full advantage of their powers was suggested by another speaker, who disclosed the international character of our gold reserves. The large volume of short-term foreign capital in this country has been a constant bugaboo, because of the danger of its quick withdrawal. In the past two years the amount of short-term foreign money in this country has been greatly reduced. At one time the total was about three billion dollars and this has been cut in half. There still remains ample gold to pay off remaining short-term balances, besides sufficient gold to meet all domestic credit requirements.

In touching on the question of eligible paper this speaker said that the banks in the aggregate have an ample supply to tap Federal Reserve credit, but that the problem is to distribute that credit adequately among all the banks.

Climax of Credit Crisis Over

The crisis in credit contraction, in Colonel Ayres's view, has passed its climax. The recent drive on the dollar has passed into history as a raid that failed. Credit expansion has again become possible, he added, although there is no way of forecasting when it will actually take place.

The financial difficulties of the past year produced what Colonel Ayres characterized as a vicious spiral of deflation breeding deflation. In the past two years, he said, there has been an extraordinary amount of shifting of funds, not on account of business transactions, but purely for safety's sake. In general, deposits have moved from smaller communities to larger ones, from smaller banks to larger banks, and from poorer countries to wealthier countries. The spirit of doubt moved from country to country like the Black Plague, causing bank failures all over the world. Banking difficulties begot hoarding, which further disturbed the banking structure. A veritable race for liquidity set in. It was found that banks that failed had been lenient with their customers and consequently the remaining banks increased their pressure for payments on loans, particularly loans secured by securities. Customers were forced to sell the securities, depressing the market, making it necessary for other loans to be paid or scaled down and for other customers to repeat the process. In addition, the banks were forced, as market prices declined, to sell securities in their own portfolios, adding to the selling momentum.

If some one had tried to invent an instrumentality to prevent business revival, he could not have created a more effective one than this cumulative deflationary policy, declared Colonel Ayres.

Remaining Clouds in Financial Sky

While Colonel Ayres and other speakers agreed that the worst phase of the world financial crisis has apparently passed, Dr. Charles J. Bullock, president of the Harvard Economic Society, stated that it cannot be said with assurance that the disturbance has run its course, in view of the position of Germany. In the past few months Germany has drastically cut its imports and has made slight gains in exports, creating a favorable balance that would, under normal conditions, suffice to cover commercial debts and part of the reparations payments. But the decline in the Reichsbank reserves has not been halted, indicating that German nationals continue to keep their funds out of the country. Liquid capital out of which payments under the Young plan must be made is fleeing Germany.

Gains in Steel Production Are Balanced by Losses

Operations Higher at Cleveland and Youngstown, But Decline Sharply at Chicago —Automotive Industry Best Immediate Prospect

WITHOUT much support from building construction and the railroads, and with buying by the automobile industry less than has been expected, steel production has held the gains of the past three weeks for the country as a whole, being estimated at 31 per cent of capacity, or the same as a week ago.

Increases in production are most emphatic at Cleveland, where operations are at 40 per cent, and at Youngstown, where the rate is 35 per cent, these districts, owing to the character of their finishing capacity, having quickly reflected such improvement as has occurred in automobile buying, but a sharp decline to 22 per cent has occurred in Chicago because of the lack of structural steel and other heavy tonnage business. Some individual companies are operating at 30 to 35 per cent or even higher, but the general average is pulled down by the poor showing of others.

However, if the present average rate is merely maintained to the end of the month, the November output of steel ingots, on a daily basis, will show a gain of fully 10 per cent over that of October, breaking the regularly downward movement since last March.

WHETHER December, traditionally a month of restricted steel operations, will continue or even maintain this month's upward trend is still uncertain. Much depends on the volume of buying by the automobile industry, particularly by the Ford Motor Co., whose long-awaited orders for production of new models are expected before the end of this month. Other important steel consuming channels are increasing their requirements only a little, if at all.

The steel industry is beginning to appraise first quarter prospects somewhat more hopefully, regardless of developments in the remainder of the year. The postponement of a number of fairly definite projects until January, the probability of some rail buying by that time, seasonal expansion in tin plate requirements and the usual increase in needs of the motor car industry in the first months of every year are counted upon to bring at least a moderate upward trend early in 1932, even though December should fail to sustain the current improvement.

NOTWITHSTANDING the increase thus far in November in steel ingot output, the making of pig iron is being curtailed in some districts. A Toledo, Ohio, blast furnace has been banked, and one at Swede-

land, Pa., has been blown out. In both cases, however, lack of sufficient merchant pig iron buying to absorb excessive stocks is responsible. In contrast with this, pig iron buying is active at Chicago, and melters are showing confidence by large purchases for forward delivery, a situation that, strangely, is quite the opposite there in steel.

WITH motor car production the best hope of the steel companies for the immediate future, attention is drawn to the continued slowness in other important lines of consumption. Building construction has taken only 12,500 tons of steel in the past week, following light lettings for several weeks. Railroads are buying very little, the order of the Lehigh Valley for 20 locomotives being the outstanding item. Oil and gas line prospects are mostly indefinite, and, though some of large size are contemplated, pipe orders may not be placed for some months. Farm equipment makers are buying steel a little more freely but cautiously. Production of new motor cars is expected to be more fully under way in December.

Considering the anxiety of the steel mills for business, prices have held surprisingly well. There have been the usual concessions on large tonnages of structural steel and plates, reinforcing bars are weak in some districts, and bolts and nuts are definitely lower, but otherwise the situation is firmer than at any time this year. A producer of hot-rolled strip steel has named prices for first quarter that existed before recent concessions were made. Silvery iron prices are off \$1 a ton.

STEEL scrap markets are fairly steady, even though substantial improvement in buying is lacking. Sales have been made in the Pittsburgh district at \$10.25 and \$10.50, delivered. A firmer tone is noticed in Detroit.

The Great Lakes navigation season will close with less iron ore on Lake Erie docks and in furnace yards than a year ago. Total stocks on Nov. 1 were 39,767,233 tons, against 41,091,680 tons on the same date in 1930.

THE IRON AGE composite prices remain at last week's levels—2.116c. a lb. for finished steel, \$14.96 a gross ton for pig iron, and \$8.75 a ton for steel scrap. Finished steel is 38c. a ton below its price of a year ago, the pig iron average is down \$1.17 a ton and scrap is \$2.92 lower.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron,

Per Gross Ton:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
No. 2 fdy., Philadelphia.....	\$15.51	\$15.51	\$16.26	\$18.26
No. 2, Valley furnace.....	16.00	16.00	16.50	17.00
No. 2 Southern, Cin'ti.....	14.69	14.69	14.69	14.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	17.00	17.00	17.00	17.50
Basic, del'd eastern Pa.....	16.25	16.25	16.75	17.75
Basic, Valley furnace.....	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh..	18.26	18.26	18.76	19.26
Malleable, Chicago*.....	17.00	17.00	17.00	17.50
Malleable, Valley.....	16.50	16.50	17.00	17.50
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seal'd car-lots	\$85.00	\$85.00	\$85.00	94.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Finished Steel,

Per Lb. to Large Buyers:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.50	2.50	2.50	2.45
Sheets, galv., No. 24, P'gh..	2.90	2.90	2.90	2.95
Sheets, galv., No. 24, Chicago dist. mill.....	3.00	3.00	3.00	3.10
Hot-rolled sheets, No. 10, P'gh	1.70	1.70	1.70	...
Hot-rolled sheets, No. 10, Chicago dist. mill.....	1.80	1.80	1.80	...
Wire nails, Pittsburgh.....	1.90	1.90	1.90	1.90
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.00
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill.	2.25	2.25	2.25	2.35
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.60
Barbed wire, galv., Chicago dist. mill.....	2.60	2.60	2.60	2.75
Tin plate, 100 lb. box, P'gh..	\$4.75	\$4.75	\$4.75	\$5.00

Rails, Billets, etc.,

Per Gross Ton:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh.	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh.....	29.00	29.00	29.00	31.00
Slabs, Pittsburgh.....	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh..	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.60	1.60	1.60	1.60

Old Material,

Per Gross Ton:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
Heavy melting steel, P'gh....	\$10.25	\$10.25	\$10.25	\$13.00
Heavy melting steel, Phila....	8.00	8.00	8.00	12.00
Heavy melting steel, Ch'go....	8.00	8.00	8.00	10.00
Carwheels, Chicago.....	8.50	9.00	9.00	11.75
Carwheels, Philadelphia.....	11.50	11.50	12.00	14.00
No. 1 cast, Pittsburgh.....	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia.....	10.50	10.50	11.50	12.00
No. 1 cast, Ch'go (net ton)...	8.50	8.50	8.50	9.50
No. 1 RR. wrot., Phila.....	9.50	9.50	10.00	13.50
No. 1 R.R. wrot., Ch'go (net)	6.50	6.50	6.50	8.50

Finished Steel,

Per Lb. to Large Buyers:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.93	1.93	1.93	1.93
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago....	1.70	1.70	1.70	1.70
Structural shapes, New York	1.85½	1.85½	1.85½	1.85½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.00
Hot-rolled strips, Pittsburgh.	1.50	1.50	1.55	1.55
Cold-rolled strips, Pittsburgh	2.05	2.05	2.15	2.35

Coke, Connellsville,

Per Net Ton at Ovens:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
Furnace coke, prompt.....	\$2.40	\$2.40	\$2.40	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Nov. 17, 1931	Nov. 10, 1931	Oct. 20, 1931	Nov. 18, 1930
	Cents	Cents	Cents	Cents
Lake copper, New York.....	7.37½	7.37½	7.37½	12.12½
Electrolytic copper, refinery..	6.75	6.75	6.75	10.75
Tin (Strait), New York.....	23.25	23.65	23.60	25.75
Zinc, East St. Louis.....	3.30	3.25	3.30	4.32½
Zinc, New York.....	3.65	3.60	3.65	4.67½
Lead, St. Louis.....	3.90	3.90	3.52½	4.95
Lead, New York.....	4.05	4.05	3.75	5.10
Antimony (Asiatic), N. Y....	6.75	6.85	6.50	7.12½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

Nov. 17, 1931
One week ago
One month ago
One year ago

2.116c. a Lb.
2.116c.
2.116c.
2.135c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

	High	Low
1931	2.142c., Jan. 13	2.102c., June 2
1930	2.362c., Jan. 7	2.121c., Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29
1928	2.391c., Dec. 11	2.314c., Jan. 3
1927	2.453c., Jan. 4	2.293c., Oct. 25
1926	2.453c., Jan. 5	2.403c., May 18
1925	2.560c., Jan. 6	2.396c., Aug. 18

Pig Iron

\$14.96 a Gross Ton
14.96
15.17
16.13

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1931	\$15.90, Jan. 6	\$14.96, Nov. 10
1930	18.21, Jan. 7	15.39, Dec. 16
1929	18.71, May 14	18.21, Dec. 17
1928	18.59, Nov. 27	17.04, July 24
1927	19.71, Jan. 4	17.54, Nov. 1
1926	21.54, Jan. 5	19.46, July 13
1925	22.50, Jan. 13	18.96, July 7

Steel Scrap

\$8.75 a Gross Ton
8.75
8.75
11.67

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
1931	\$11.33, Jan. 6	\$8.71, Oct. 27
1930	15.00, Feb. 18	11.25, Dec. 9
1929	17.58, Jan. 29	14.08, Dec. 3
1928	16.50, Dec. 31	13.08, July 2
1927	15.25, Jan. 11	13.08, Nov. 22
1926	17.25, Jan. 5	14.00, June 1
1925	20.82, Jan. 13	15.08, May 5

Pittsburgh Mills Expect Further Automobile Orders This Week

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PITTSBURGH, Nov. 17.—Despite the failure of aggregate finished steel releases this month to show any material improvement over those of October, sentiment in the industry continues favorable and steel ingot production is maintained at recently improved levels.

Reports from Detroit indicate that this week may bring the long-awaited releases from the large automobile makers. Repeated postponement of this business has been exceedingly discouraging. Demand from the other large consuming industries is about the same. The railroads are showing virtually no definite interest in their 1932 requirements, and steel makers expect no commitments from this source until after the turn of the year. Agricultural implement makers served by this district continue to increase their needs, and orders for merchant wire products, galvanized sheets and other products going to the farming industry are more numerous, if not in larger volume.

Demand for oil country goods is still spotty, and interest of the pipe makers is centered in prospective pipe line tonnage, which can hardly be placed before late winter or spring. In the meantime, additional releases on pipe tonnage placed earlier in the year have brought some encouragement, and there is also promise of some miscellaneous tonnage being placed in the immediate future for gathering lines on existing projects.

Steel ingot production in the Pittsburgh district is being maintained for the third consecutive week at about 30 per cent of capacity. The local rail mill is still running in a limited way and tin plate production is well maintained at 45 per cent of capacity. Sheet mill schedules are a trifle higher and pipe mills are running somewhat better as the result of recent releases and small rush orders. Ingot production in the Wheeling district is also holding at recent levels, while output in the Valleys has risen slightly to 35 per cent.

Blast furnace operations are unchanged in the Pittsburgh and nearby districts, being now so low that accumulation of steel-making pig iron has practically ceased.

Steel prices have been subject to some weakness recently, as large buyers have been sounding out the market with substantial inquiries. On sheets, for instance, makers have been asked to quote for first quarter and have either refused to name prices or

Steel ingot production maintained in Pittsburgh and Wheeling districts and up slightly in Valleys.

* * *

Sentiment continues favorable, although not much further improvement is expected this year.

* * *

Long-awaited releases of automobile steel expected this week.

* * *

Steel prices subject to some shading, particularly on large tonnages of shapes and plates. Bolt and nut prices lower.

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have asked for increases over the present schedules. No buying has resulted. Strip quotations are holding fairly well at recently reduced levels. On the heavy hot-rolled products, concessions are common on desirable structural tonnages, but the market on small lots is maintained at 1.60c., Pittsburgh. Bolt prices are definitely lower, following weeks of chronic price shading.

Pig Iron

Business during the last week has been at a standstill, with scarcely any purchases reported and shipments maintained at recent levels. Current market prices are difficult to ascertain because of the lack of buying, but sales of carload lots, which constitute the bulk of current transactions, seem to be continuing at recent quotations. The local merchant producer is quoting foundry, malleable and Bessemer iron at the same level, the price being \$17, furnace. Valley makers have had occasion to meet this quotation on foundry iron with a price of \$16, Valley furnace. This has brought the spread between Valley and Pittsburgh district merchant furnaces to \$1 a ton instead of the 50c. which has prevailed in the past. No sales of malleable or Bessemer iron from Valley furnaces are reported, and, in the absence of buying, quotations in the Valleys continue

nominal at \$16.50, Valley furnace. Such prices, however, apply only to local transactions in the immediate Valley district, as furnaces in that territory would have to make lower prices to meet the competition of Lake Erie producers in northern Ohio or of the Pittsburgh furnace in this district. The basic market is without feature, and no buying is reported to establish a quotation.

Semi-Finished Steel

Shipments during the first half of the month compared favorably with those of the corresponding October period, but no appreciable gain is reported. New buying is almost entirely lacking. Prices on billets, slabs and sheet bars are holding at \$29, Pittsburgh or Youngstown, in the absence of any adequate test. Wire rods are apparently well maintained at \$35, Pittsburgh or Cleveland.

Rails and Track Supplies

This market continues very dull, and the major carriers are offering no intimation of their probable purchases for 1932. Mill operations this week are being maintained at about the level which has prevailed since the first of the month.

Bolts, Nuts and Rivets

Demand has not increased and, with such large consumers as the railroads and the automobile industry taking little tonnage, production is holding at recent low levels. The granting of an extra discount of 10 per cent, in addition to the regular schedule of 73 and 10 per cent off list, on bolts has become so common that it is being recognized as the regular market to jobbers and large consumers. Large rivets are holding at \$2.25 per 100 lb., and small rivets at 70, 10 and 5 per cent off list.

Bars, Plates and Shapes

While promise of heavier tonnage in the heavy hot-rolled products is continued, the improved sentiment is not backed up by orders. Little new structural tonnage is coming into the market, and shipments are being completed on many projects begun earlier in the year. The Pittsburgh district prospects are particularly dull, with the Post Office about the only sizable job in the offing. Barge inquiry is still active, but significant buying will probably be postponed until after the first of the year. Other large users

CURRENT MARKET PRICES FOR
STEEL, PIG IRON AND OLD MA-
TERIAL WILL BE FOUND ON PAGES
1340 TO 1344, INCLUSIVE

of plates, including the railroad car builders and tank fabricators, are running at reduced rates. Reinforcing bar business is declining seasonally, and not much new tonnage is coming out. A slight gain in demand for alloy steel bars from the automobile industry is reported. Prices on small orders for bars, plates and shapes are holding at 1.60c., Pittsburgh, although the tendency toward concessions on large and medium-sized structural steel orders seems to be growing.

Tubular Goods

Prospective line pipe projects are still a feature of this market, but the larger makers are unable to suggest any inquiries which may be expected to be let before early spring. One large order for 24,000 tons of 20-in. pipe, which was placed several weeks ago, is just now being released, and another mill has taken 15 miles of 10 3/4-in. material for use in the same project. Some tonnage is also involved in gathering lines for this as well as other pipe line jobs. Demand for standard pipe is holding at recent levels, but no expansion is indicated for this season. There is still some movement of oil country goods to the mid-continent fields, but such business is spotty. Slight improvement in demand for mechanical tubing from automobile parts makers is reported.

Wire Products

Various reports of improved demand for merchant wire products are heard in this district, but aggregate tonnage thus far in the month has proved to be rather disappointing. In some sections jobbers are more disposed than heretofore to place rush orders for small lots, but none of them seems to be making any effort to build up depleted inventories before the beginning of the new year. Manufacturers' wire is a trifle more active, but demand on the whole is disappointing. Prices are holding much better than usual at 2.20c., Pittsburgh, on manufacturers' wire, and \$1.90 a keg on nails.

Sheets

Releases for sheet steel continue to show improvement in the case of some makers, but the month to date has shown only a moderate improvement over October. However, a large producer had the heaviest specifications last week since late August. Orders from the automobile industry are still restricted, but have shown a gradual expansion since the first of the month. No change in the requirements of the other leading consuming industries is reported. Production has been slightly heavier in the last few days, and mills this week are scheduled at about 30 per cent of capacity. In spite of this, the current tonnage is unevenly distributed, and sharp variations in schedules are the rule. Prices are unchanged, and are holding well on most finishes. A few buyers have asked for coverage for first quarter at present quotations, but mills are inclined

to quote higher prices on forward business than those now in effect. Jobbers of seconds have been in the market rather actively in the last week or two.

Tin Plate

Contracting for the first half of 1932 is still rather sluggish. Some users of tin plate are unwilling to make commitments until the credit standing of their customers can be fully ascertained. Tin plate operations are holding at about 45 per cent of capacity, with some of the larger producers working largely on anticipated tonnage.

Strip Steel

Specifications from the automobile industry are a little heavier with some producers, but aggregate business from this source has not gained materially. Other consuming channels are quiet, and activity in the strip industry as a whole has not passed the 25 per cent average. Prices are fairly well held at the reduced levels which became effective a short time ago.

Coke and Coal

Furnace coke is very quiet, and demand for the foundry grade thus far

in the month indicates a falling off from the corresponding October period. Heating coke, as well as domestic coal, is moving fairly well, but continued warm weather has deferred substantial buying.

Old Material

With the exception of small purchases of No. 1 heavy melting steel by one buyer at \$10.25 and \$10.50, depending on the point of delivery, the scrap market has been without feature in the last week. Another company is reported to have picked up a small distress lot of this grade at \$10, but sales at 25c. a ton higher are much more representative of the market. None of the dealers is willing to make a substantial commitment even at this price, as scrap is not available at less than \$10, and dealers are having difficulty in covering such small tonnages as they are taking. No price changes are reported on the other grades, largely because of the lack of transactions. Generally speaking, the tone of the market is hardly as strong as it was last week, as there is little chance of further increase in steel ingot production in the remaining weeks of the year, and some curtailment seems likely during December.

St. Louis Sentiment More Hopeful Owing to Turn in Agricultural and Oil Market Conditions

ST. LOUIS, Nov. 17.—While melters of pig iron in the St. Louis industrial district are in a more optimistic mood as a result of the improvement in the agricultural and oil situation, their feeling has not yet developed into any business of consequence in pig iron. The movement continues on a hand-to-mouth basis. Makers do not expect any sizable orders until after the first of the year, especially as melters are more concerned than ever in holding down the size of their inventories. The price situation is firm and unchanged.

Finished Steel

Four open-hearth furnaces are operating in the district, which is about 14 per cent of capacity.

The Pet Milk Co. has awarded contracts for its 1932 requirements for tin plate for its six canning plants. While no amount is specified, it was stated that it will be about 12,500 tons, which is an increase over the 1931 consumption.

The largest structural project now pending is the North American Co. Building, to be erected at Twelfth Boulevard and Washington Avenue, which will require 2000 tons of structural steel and 400 tons of reinforcing bars. A sewer here will require 100 tons of reinforcing bars.

Business in plates, shapes and bars is quieter than ever, largely as a result of the desire of all buyers to hold down inventories. Although there

seems to be a better feeling in the trade, not much buying is expected until after the turn of the year.

Old Material

Within the last week, there has been some speculative buying by dealers of railroads' offerings of scrap, although there seems to be nothing in the attitude of their customers, the mills, to warrant such action. Mills are not buying, and nothing much is expected from that source until after Jan. 1. Prices are unchanged. Railroad lists: Chicago, Burlington & Quincy, 9390 tons; Louisville & Nashville, 4306 tons; Alton, 800 tons; Nashville, Chattanooga & St. Louis, nine carloads.

Detroit Scrap Market Has a Firmer Tone

DETROIT, Nov. 17.—Despite a quiet week, the local scrap market has a firmer tone. The few sales which are being made consist of material obtained currently from producers at present quotations, dealers being unwilling to sell yard stocks at present prices. In most cases dealers paid more for these stocks than they could now realize, and consequently they are holding this material in anticipation of a higher market 30 to 40 days hence.

Chicago District Steel Ingot Rate At 22 Per Cent Despite Some Gains

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CHICAGO, Nov. 17.—The Chicago district steel market is slowly undergoing changes that appear to be building a firmer foundation. There are, however, factors that are operating against a clear expression of such gains as already have been made. Foremost among these is the approach of the inventory and holiday periods. Consumers, even in normal times, attempt to liquidate stocks at the year end. They are at present without stocks of size, so they are concentrating on the avoidance of commitments and refuse to order out more than barest needs. The effects of this on the finished steel market are a moderate amount of buying in mixed and small lots, the insistence on prompt deliveries, rather a steady draft against warehouses, which normally would be experiencing a downward trend in demand, and specifications to steel mills that are measurably better than the average of the past four weeks. This week in semi-finished steel is the best so far this fall.

In pig iron, inquiries are now of the order of 500 tons to 1000 tons each, rather than for 100 to 400 tons, as was the case when the present modified buying movement started. It is in the pig iron market that the greatest confidence is expressed in the future trend of business.

Finished steel, covering as it does an extremely broad range of products, is showing rather wide fluctuations in demand from week to week, a condition readily brought about at a time like this when large tonnages, such as needed for building purposes, necessitate bringing additional capacity into service and by their absence as quickly cause a drop in the rate of ingot output. Absence of structural business is being keenly felt this week. Seven open-hearths have been taken off and only two added, bringing production here to less than 22 per cent of capacity.

Pig Iron

Consumer interest in purchases of Northern foundry iron is outrunning the growth in shipments, indicating greater confidence in the future. Deliveries continue to climb slowly, but both inquiries and sales mark this as one of the best weeks so far this fall. Several lots of 1500 tons each have been placed, which is in contrast with the market earlier in the fall when a few hundred tons constituted a large

Gains in business in some directions not sufficient to overcome losses elsewhere, and ingot rate for district is down to 22 per cent.

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Continued growth of forward buying in pig iron the outstanding favorable factor in market.

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Steel mills adversely affected by dearth of structural steel and other heavy tonnage business.

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Quotations on silvery iron and Bessemer ferrosilicon lower.

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order. Stove manufacturers in Michigan are near the end of their fall schedules, but stocks are low and they plan to operate during most of the winter. Many automobile foundries are standing by with small pick-ups noted here and there. Orders for a 3500-ton cargo of Cleveland iron have been taken in the Chicago-Milwaukee territory at low prices. The silvery market is dull and prices are off \$1 a ton. The 8 per cent grade is now quotable at \$20 a gross ton, Jackson County furnace, or \$24.79, delivered Chicago. Two cargoes of Lake Erie silvery are due at Chicago docks.

Coke

Contracting in by-product foundry coke is under way for the whole year, the half year and the first quarter. The price is steady at \$7.50 a ton, local ovens. Shipments continue to grow slowly.

Ferroalloys

Word has not reached here as to prices that will prevail for delivery next year. Consumer interest is low both as to releases and new purchases.

Reinforcing Bars

Illinois State work again gives promise, as contracting goes forward on buildings and bridges that will be constructed during the winter. Mild weather has permitted road building to go forward, and sellers of bars are still furnishing tonnages for this purpose. Otherwise, the market is quiet,

with estimators finding little to do even on jobs ranging downward from 25 tons. It is possible that some paving contractors will take advantage of present quotations and close bars needed in the spring.

Bolts, Nuts and Rivets

Consumers who order direct from producers are showing no inclination to take larger quantities of these commodities. On the other hand, jobbers report distribution somewhat heavier and their orders from producers are gaining in size.

Wire Products

Demand is running fairly uniform, with slight improvement noted from some rural districts. Whether improved sentiment and higher prices for grains will be reflected in wire business to any extent this fall is problematical. Unquestionably dealers are moving larger quantities, but earlier in the fall they had specified rather liberally and it is doubtful if their needs from mills will climb much before the end of the year. The fact is that producers are turning their attention to the spring trade. Enlarged mill stocks are already contemplated and some are actually growing. It is expected that many farmers will improve their credit standing if they do not have actual cash for their spring needs.

Cast Iron Pipe

One of the greatest difficulties with which this market is faced is the inability of many municipalities to dispose of bond issues. The Fort Wayne, Ind., filter project is one of the few large active jobs. It is reported here that the bonds are still to be sold and that construction work may get under way early in December. The market is sluggish, which is not an unusual condition in November. Action on a few plans prepared by towns in the Northern part of the country has been postponed until early next year.

Warehouse Business

As might have been expected from the recent movement of grain markets, demand from warehouses for delivery in the country is somewhat broader and heavier. On the other hand, city users are taking smaller quantities and, as a result, the aggregate movement is about equal to the average so far this month. In normal times

there is a gradual recession in demand in November.

Sheets

The characteristics of this market remain unaltered. Output is not above 25 per cent and mill schedules are being forced to subsist on scattered and small-lot orders for prompt delivery. Movement from warehouses is spotty and small. Roofing and conductor pipe manufacturers are trying to sell their trade for spring delivery, but they are having little or no success either in rural or urban areas. Prices remain steady. However, it has been many weeks since tonnages of test size have made their appearance.

Cold-Rolled Strips

The 2.15c. a lb., Cleveland, price has virtually disappeared from this market, current quotations being 2.05c., Cleveland, or 2.33c., delivered Chicago. Demand is somewhat better in automobile manufacturing centers.

Rails and Track Supplies

As each week passes it becomes more evident that the remainder of 1931 is to be quiet in the placing of rail tonnage. Local mills are keeping a semblance of a rolling schedule with a few odd lots and what remains of the Chesapeake & Ohio orders. In the background are the Santa Fe rails, against which it is understood no releases have as yet been made. As matters now stand, one producer will be without a rail rolling schedule by the end of this month.

Structural Material

Although awards total only 3000 tons, new projects aggregate 11,000 tons and projects that are actively before the trade total about 20,000 tons. These figures reflect an improvement over conditions earlier in the month, but the outlook is still far from satisfactory, particularly for the reason that a number of shops are almost without work. What support there is to the market is coming almost wholly from public projects.

Plates

Of interest in this market is an inquiry from Evanston, Ill., for 1500 tons of plates for a water tank. The railroad equipment market is active only to the extent of an old inquiry for 150 gondolas and a request for 300 underframes.

Bars

Mills that ship bars to automobile manufacturing centers are experiencing a moderate upturn in demand. Farm implement manufacturers are also taking somewhat larger quantities. Bar mill schedules are more satisfactory than those of other heavy tonnage finished products.

Old Material

Dealers are inclined to look upon the local market as one in which

supplies are rather thin but ample to meet current demand. They contend that an increase in melt, a condition they do not expect until after the turn of the year, would lend material strength to the price structure.

The Burlington is offering a list for the third time this month. Bids have

been rejected twice in attempts to get \$9 for heavy melting steel when dealers appraise this grade at about \$8. A small tonnage of borings is on a Chicago dock. This is said to be an overrun of purchases made for the last cargo that left for a Lake Erie port.

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Buffalo Pig Iron Sales Show a Slight Gain; Steel Industry Is Operating at Its Recent Rate

BUFFALO, Nov. 17.—Pig iron producers note a much better feeling. Apparently no large orders have been taken, but there is a distinct improvement in the sales of 100 to 200-ton lots. Present buying presages an improved melt. An unexpected movement of iron by barge was very encouraging to makers. It is understood that a large Eastern melter purchased 1000 tons of foundry, but none of this came to Buffalo. Buffalo iron is obtainable in New England at \$15, furnace, but a great many small contracts have been closed at \$15.50 and \$16. Worthington Pump & Machinery Corp. is inquiring for 475 tons of foundry for its Harrison, N. J., plant. Most producers report a cumulative monthly increase in shipments since June.

Finished Steel

The Lackawanna plant of Bethlehem Steel continues to operate eight open-hearth; Republic Steel is operating three open-hearths, together with its bar and blooming mills; Wickwire Spencer is operating two open-hearths; Seneca Iron & Steel Co. is operating at about 45 per cent, with further improvement expected.

Old Material

The largest consumer in the district is reported to have purchased two small lots of No. 1 heavy melting steel at \$8.50. This consumer which had suspended shipments until Nov. 15 has further suspended until Nov. 23. This was largely due to an accumulation of boat shipments.

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Valley Steel Production Gains, Mostly Because of Better Orders from the Automobile Industry

YOUNGSTOWN, Nov. 16.—Gains in steel ingot production last week, as well as improved schedules on sheet and pipe mills, gave considerable encouragement to Valley steel makers. However, the increased activity resulted partly from the accumulation of orders over the two or three preceding weeks, when production was kept at a minimum. Because of this, steel executives are still very cautious about predicting further gains in the next week or two, although they do believe that operations can be sustained at close to the present rate over the remainder of the year.

Actual specifications for finished steel products in the first half of the month exceeded the October average by a very narrow margin. Much of the tonnage came from automobile and parts makers, but releases on one or two fairly large pipe orders were helpful. Better demand for wire products has developed in the last few days, and the local producer is running at a better rate than it has in many weeks. Tin plate production at Warren is holding at approximately 50 per cent of capacity, although this rate is occasionally bettered. Bar mills generally are making a poor showing in the district, as this tonnage is improving very little. Some added demand for alloy bars and cold-finished products is expected to de-

velop from the automobile industry before the end of the month.

Local consumers of finished steel have not increased their needs as yet, but many of them are being influenced by the improved sentiment which has been noticeable in the market since the first of November. This has resulted in a prospect for improvement, even in the final month of the year, which is generally contrary to precedent among Ohio manufacturers, who must reduce inventories to a minimum at the year-end in order to avoid a rather heavy tax.

Heavier inquiry on the part of a number of buyers of steel is giving the price structure the first test since mid-summer. Strip steel is holding at recently reduced levels, and thus far no irregularities in sheet prices have appeared, particularly in the immediate district. Bars are well maintained in the face of quiet demand.

The scrap market has not shown much activity, although higher steel ingot operations last week brought increased shipments to certain consuming points. Nevertheless, large users in the district are well covered for the remainder of the year, and any substantial buying would probably represent an attempt to take advantage of low prices rather than actual needs. Pig iron is very dull, with scarcely any sales reported upon which to base market quotations.

Cleveland Mills Operating at 40 Per Cent This Week

Recent Buying Volume, However, Has Not Been Maintained—
Ford Motor Co. Still Delays Much of Its Buying

CLEVELAND, Nov. 17.—The volume of business in finished steel the past few days indicates that the gain reported a week ago is not being maintained. However, the tonnage entered is ahead of that in the corresponding period of October. Orders from the motor car industry have slackened, following a spurt of buying steel for new models. However, hot-rolled strip was fairly active the past week.

Steel plant operations in Cleveland have been stepped up this week to 40 per cent of ingot capacity, the best since last June, one local mill that has taken some good motor car tonnage having put on three additional open-hearth furnaces. Fourteen local open-hearths of 34 are now operating.

The looked-for inquiries from the Ford Motor Co. for steel for its new models have not yet come out. Few metal-working plants outside of the automotive field have increased production, and these are buying steel very sparingly.

Interest in the construction field is centered in several pending public jobs. Reinforcing bars aggregating 2925 tons for a municipal exposition hall and garage and a State highway bridge have been placed; for the former job, 2000 tons of bars will be supplied by a Cleveland mill. For a Cleveland sewage disposal plant, 4700 tons of bars will be supplied by the Concrete Steel Co. from a Republic mill. For this job, 1350 tons of sheet steel piling was divided between Buffalo and Chicago mills, both of which succeeded in taking this business because they will ship the steel by water. No new railroad inquiry has come out.

Aside from irregularity in strip steel, reinforcing bars and bolts and nuts, prices generally are being maintained. A local mill has named 1.55c. and 1.65c., Pittsburgh, for hot-rolled and 2.10c., Cleveland, for cold-rolled strip for the first quarter, although no interest has as yet been shown in prices for that delivery.

A few sales of pig iron have been made for the first quarter at current prices.

Pig Iron

Inquiry, principally from the motor car industry and to some extent from the agricultural implement manufacturers, has improved. Sales, however, continued light the past week. A few consumers who needed iron to carry them through the year made purchases that also covered their requirements well into or through the first quarter, business for delivery in next

year being taken at current prices. Shipping orders for the last half of November show a gain as more iron will be taken by the automotive foundries. Shipments through the first half of the month were practically the same as in October. The second Toledo furnace has been banked. Local prices for foundry and malleable iron range from \$15.50 to \$16 for delivery at competitive points. For Cleveland delivery, the price is untested at \$17.

Sheets

While larger releases are reported in the Michigan territory, activity in this district was rather light the past week. The local Fisher Body plant is now running its press shop on two 8-hr. shifts on new model Chevrolet bodies, but has not yet got under good production. Prices are firm. A local mill has opened its books for the first quarter at the present prices of 2.40c., Pittsburgh, for hot-rolled sheets and 3.10c. for auto body sheets.

Iron Ore

The season of Lake navigation will close with less ore on docks and in furnace yards than a year ago. Ore stocks in furnace yards and at lower lake docks Nov. 1 was 39,767,233 tons, against 41,091,680 tons on the same date a year ago. Consumption of Lake ore during October was 1,451,174 tons, against 1,470,219 tons in September and 3,050,060 tons in October last year. Consumption by Central and Eastern district and all-rail furnaces gained in October, but this was more than offset by a decrease in the consumption by Lake front furnaces.

The last ore cargoes from the head of the Lakes were shipped Monday. Two or three cargoes are yet to be moved from Escanaba. This month's shipments amount to 390,000 tons, exclusive of a few last cargoes. The total water movement for the season will be close to 23,500,000 tons, as recently estimated.

Strip Steel

A good volume of business in hot-rolled strip came from the motor car industry, lamp and other accessory manufacturers the past week. Demand for cold-rolled strip also showed some gain. For hot-rolled material in good lots, 1.50c., Pittsburgh, is the prevailing price for wide strip and 1.60c. for narrow. Small lots are bringing \$1 a ton higher. On cold-rolled strip, 2.10c., Cleveland appears to be the common price except for small lots. A Cleveland mill has announced its withdrawal of the present minimum prices on hot-rolled strip and is now naming 1.55c. for wide and 1.65c. for narrow for the first quarter and for current orders. The same producer is quoting cold-rolled strip at 2.10c. for the first quarter.

Bars, Plates and Shapes

Merchant bars are not very active, although they are moving somewhat better than plates and shapes. Two tank jobs requiring 550 tons of plates were placed. New structural inquiry is light. While reinforcing bars are quoted at 1.50c., Cleveland, this does not appear to be the bottom price on round tonnages. Merchant bars are steady at 1.65c., Cleveland, and plates and shapes are holding at 1.60c., Pittsburgh.

Old Material

With local mills not taking scrap, the market is almost at a standstill. A small amount of No. 2 heavy melting steel is moving to the Valley district, where dealers are paying \$8.75 to \$9 for this grade. Prices are unchanged and untested.

Pacific Coast Steel Trade Not Improving; Imports Continue in Substantial Volume

SAN FRANCISCO, Nov. 16.—Neither the mills nor warehouse trade anticipate an important change in the volume of business for several months. Except for Federal post offices, no important building is in prospect. About 5500 tons of steel was embraced in contracts placed during the past week.

The schedule of warehouse prices at Seattle applying to the Pacific Northwest has been materially raised to bring prices more nearly in line with those applying in California.

Reports of foreign steel imported on the Pacific Coast in September, just released, indicate that this area continues to absorb over 25 per cent of the merchant steel bars, over 15 per cent of the structural shapes and

approximately 50 per cent of the nails and wire products received through all United States ports.

Finished Steel

About 2200 tons of structural steel was placed. New inquiries total 400 tons. Awards of reinforcing bars on open contracts were over 500 tons, and new inquiries for 850 tons were received. Plate lettings aggregate 2800 tons, including 1800 tons for six reservoir tanks for Long Beach.

Cast Iron Pipe

Awards of 238 tons are reported on public lettings, with new inquiries for slightly over 1000 tons. Santa Cruz, Cal., is contemplating a 14-in. line that will require 800 tons.

Eastern Pennsylvania Plate and Shape Orders Decline

Plate Mill Operations Lower and One Structural Mill Has Shut Down for the Week—Dutch Pig Iron a Market Factor

PHILADELPHIA, Nov. 17.—With operating rates of plate mills curtailed and one shape producer not running this week, the average rate of steel production in this district is not more than 25 per cent of capacity. Sheet prices are being maintained by mills, but in certain instances jobbers selling for direct shipment from the mill, and receiving a \$2 a ton reduction, have sold galvanized sheets at 2.85c., instead of 2.90c., Pittsburgh.

While a moderate tonnage of hot-rolled strip steel has been arriving at this port from abroad, most of these imports are stated to be for manufacture of tubing to be re-exported. Recently a substantial quantity of foreign bolts and nuts has been sold here through a local importer at prices slightly under the domestic level.

New short haul freight rates into Philadelphia are 8½c. per 100 lb. from Coatesville, 4½c. from Pencoyd, 6½c. from Phoenixville, 10½c. from Bethlehem.

Ten locomotives awarded to the Baldwin Locomotive Works by the Lehigh Valley Railroad will require about 350 tons of plates; 1000 tons of plates for repairs to 500 hopper cars will be awarded soon by the Norfolk & Western; 8000 tons of plates will be bought for a ship by the Newport News Shipbuilding & Dry Dock Co., and about 3000 tons of sheet piling is required for channel maintenance at Pea Patch Island, Fort Mifflin.

Pig Iron

The blast furnace at Swedeland, Pa., was blown out Nov. 15, leaving only the furnaces of the Bethlehem Steel Co. still operating in eastern Pennsylvania—two at Bethlehem and one at Steelton, Pa. Pig iron producers are endeavoring to maintain a firmer attitude on prices than in recent weeks, but large consumers have been offered foreign foundry iron at \$15 a ton, delivered. Most of these users, however, have recently covered their nearby requirements. New agents for Royal Dutch iron are considering the establishment of a stock in or near Philadelphia, which suggests that this brand of foundry iron may be more of a factor in this district than in the past. A medium-sized tonnage has been sold. Basic iron continues quiet, with most users covered until the end of this year or beyond.

Steel Bars

Consumers are slightly more active and are specifying more freely against contracts, but individual orders are still small. Billet steel reinforcing bar prices are subject to concessions of \$1 and \$2 a ton on large orders, but most current business is in carload lots.

Sheets

Automobile body builders are negotiating for sheets and have closed on some small tonnages. A motor car manufacturer, which has been using aluminum sheets for parts of truck and bus bodies, is experimenting with special grades of galvanized steel sheets. The usual \$2 a ton concession granted to jobbers on sales for direct shipment of galvanized sheets has been expanded somewhat and, in certain cases, jobbers and distributors have been able to buy at the \$2 a ton reduction, even for their own stocks. Local sheet consumers are maintaining the operating gains of recent weeks, so that sheet demand is slightly more active than that for

other products, although still very small.

Shapes and Plates

Demand for both plates and shapes is limited. On the new short-haul rates in effect, shapes at 1.65c., nearest mill to consumer, are quotable at 1.69½c., Philadelphia, based on Pencoyd, Pa. Plates at 1.70c., Coatesville, Pa., are quotable at 1.78½c., Philadelphia. Plate mills are operating at curtailed rates, and one shape mill has suspended operation entirely for this week to accumulate orders. While most of the prospective shape business is limited to small tonnages, some fair plate orders may be placed with eastern Pennsylvania mills.

Imports

In the week ended Nov. 14, 4146 tons of pig iron and 255 tons of chrome ore arrived at this port from British India. Other imports consisted of 100 tons of steel bars and five tons of steel bands from Belgium and 16 tons of iron bars from Sweden.

Old Material

Except for the purchase of about 500 tons of No. 2 heavy melting steel at \$6.50 a ton, delivered to Pencoyd, Pa., the scrap market is without feature. Deliveries of No. 1 heavy melting steel to the user at Coatesville, Pa., and No. 2 steel to Phoenixville and Conshohocken, Pa., have been temporarily suspended.

Birmingham Sees Possibility of Improvement in Steel But Pig Iron Business Is Sluggish

BIRMINGHAM, Nov. 17.—Pig iron buying continues to follow a sluggish course, without signs of early change. Melters are still ordering only for actual current requirements. Shipments this month are lagging slightly behind those of October. One company has shipped just about its current make, while two others have added to their yard stocks. Foundry operations throughout the South are at a very low rate. District quotations remain firm on a \$12 base. Six furnaces are in operation, the same number as for the past three weeks.

Finished Steel

One company reports that bookings and inquiries last week showed a very marked improvement. Another company had only an average week. In some sections there are prospects of slight improvement in some lines of steel for late November and early December. In States where there are inventory taxes stocks are being held down and there will be a minimum of buying until after the first of the year. Fabricators of structural steel and re-

inforcing bars booked very little new business the past week. During the present week about 600 tons of bars will be available from road lettings in Alabama and Georgia and a veterans' hospital unit at Tuskegee. The Tennessee company operated five open hearths last week at Fairfield. Gulf States Steel kept its open-hearth out for nearly two weeks and did not resume operations until last Saturday.

Cast Iron Pipe

New tonnage last week was mostly in carload lots. McWane Cast Iron Pipe Co. has been awarded 2500 tons by Yoakum, Tex., but this is held up by a bond injunction suit. Plant operations continue around 30 per cent. Quotations are on the basis of \$33 to \$34.

Old Material

Demand is irregular and at a minimum. Shipments on contracts have varied little during the past two weeks and have not been large. Prices are unchanged.

New York District Experiences Only Slight Business Recovery

Sales of Finished Steel and Pig Iron Are Better, But Gains Thus Far Are Not Impressive

NEW YORK, Nov. 17.—Open inquiry for pig iron is limited to 475 tons for delivery over the next three months to Worthington Pump & Machinery Corp.'s Harrison, N. J., plant. Several district buyers are negotiating quietly on fair-sized tonnages, aggregating about 2500 tons, specified for early delivery, but which will probably run into first quarter. Total sales at about 5000 tons compare with a like amount the previous week and 4000 tons two weeks ago. A recent sale of 1000 tons of foundry iron was made to a northern New Jersey melter. More numerous sales of Royal Dutch iron, which has not been an important factor in the local district for the past year, indicate that this brand is being offered at prices comparable with those prevailing on domestic irons. The distributor of Royal Dutch iron is contemplating carrying of stocks of this iron at a New England point and in or near Philadelphia.

The coke producers at Everett, Mass., Providence, R. I., and New Haven, Conn., have opened their books for acceptance of first half foundry coke contracts.

According to figures received by THE IRON AGE, the total of pig iron and billets shipped on the State canal during the current season up to the end of October was 65,477 tons.

Reinforcing Bars

Prices are unchanged at 1.60c., Pittsburgh, or 1.93c., delivered New York. New projects include the Meadowbrook Hospital on Long Island, which will require 695 tons of bars, and a sewer on Forty-ninth Street, running from Tenth Avenue to Hudson River, New York, which will take about 500 tons.

Finished Steel

Steel business in this market is making slight gains in certain spots or is holding its own. Gains this month, while noticeable, have not been impressive. Some products have not shown any improvement; on the contrary, plates and shapes seem to be in smaller demand. Some orders for tin plate for rush shipment have helped out bookings of certain mills in the past week.

On the ordinary small orders, prices show a fair degree of stability. Concessions are available, however, on the larger lots of plates and shapes. Bolt and nut prices are lower, discounts of 73, 10 and 10 per cent off list, which have occasionally been

given in recent weeks, now appearing to be quite general.

Specifications on several projects requiring round tonnages of structural steel are expected to be issued soon. Preliminary estimates include 1200 tons for an armory in Jamaica, N. Y., and 3500 tons for a Department of Health building in New York.

Cast Iron Pipe

Demand for pressure pipe has diminished in the past week. New inquiry is confined to 360 tons of 4 and 12-in. for the Department of Water

Supply, Gas and Electricity, New York, on which bids will be opened this week. Recent awards included 425 tons of 12-in. for New York to Warren Foundry & Pipe Corp., and 300 tons of 6 and 8-in. for subway work in Boston to United States Pipe & Foundry Co. Base price on pipe is \$32.90, delivered New York.

Old Material

Occasional carload lots of No. 1 steel are being shipped to the consumer at Coatesville, Pa., for which brokers are paying \$8 a ton, delivered. The scrap company which has been shipping No. 1 and No. 2 steel to Buffalo by barge is building up stocks of these grades at \$5.50 a ton, loaded on barges, which are laid up in New York harbor for the winter. A Japanese trading company has placed orders for upward of 10,000 tons of No. 1 steel for export to Japan, but all shipments will be from accumulations in Texas and other Southern States.

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Cincinnati Automotive Foundries Increase Melt; Demand for Sheets Shows a Moderate Gain

CINCINNATI, Nov. 17.—With a slight improvement in the melt of automotive foundries, the district pig iron market reflects a more cheerful tone. The melt of machine tool foundries, however, on the other hand, is still low. Shipments on contract have been better, and total fresh bookings at 1500 tons, exceeded those of the previous week by about 300 tons. Prices of Northern iron are such as to attract bargain seekers to the market, although none of last week's orders were for more than one or two cars. Consumers are watching market conditions carefully and are buying only for immediate use. The only sizable inquiry is from an Ohio melter

for 500 tons of Northern foundry iron. Shipments of coke on contract have gained slightly this month.

Finished Steel

Improvement in automotive buying of sheets has continued, bringing the demand upon district mills nearly to 40 per cent. Mill operations are in keeping with current demand.

Old Material

Better prices paid on railroad lists last week have contributed a better feeling among scrap dealers. New business consists almost wholly of bargain orders. Shipments against old commitments are slow.

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Canadian Steel Industry Sees Some Improvement

TORONTO, Nov. 16.—From a state of almost stagnation, the pendulum of business in the Canadian iron and steel industry is beginning to swing back. Mills are showing some gains in new business and are preparing for increased operations. The Dominion Steel & Coal Corp., whose plant at Sydney, N. S., has been practically at a standstill since early in October, started up its blooming mill on Nov. 12 to fill a number of orders recently obtained. The two merchant mills of the Algoma Steel Corp., Sault Ste. Marie, Ont., are said to be

fairly active. The company's rail mill, however, has been idle since last August. Though some rail orders are looked for within the next few months, it is not expected that they will run to as large a tonnage as those of the previous year or two, owing to the curtailment in buying by the railroads.

Pig Iron

The improvement that has taken place recently in some branches of industry has not yet had a noticeable effect on pig iron. Sales are in small lots. It is expected that the Dominion Steel & Coal Corp., and the Algoma Steel Corp., will each blow in a furnace soon. A stack at Hamilton,

Ont., is the only one in blast in Canada.

Old Material

A slight flurry in business was experienced in this market during the week. Several consumers were out of stock and placed small orders. Practically all the business, however, was in iron grades. The demand for steel scrap is practically at a standstill. Dealers are still out of the market and have made no revision in prices.

Boston Jobbers Reduce Prices on Bolts

BOSTON, Nov. 17.—It was a colorless week in pig iron, sales falling below 1000 tons and consisting of car lots for prompt or nearby shipment. Aside from two 100-ton inquiries, there is little business in prospect. The Connecticut melt is a little heavier than it was a month ago, but the showing in the rest of New England is not quite as good. Buffalo iron is held at \$15 a ton, base, furnace, and prices quoted by furnaces in other districts appear to be in line with Buffalo.

Cast Iron Pipe

United States Pipe & Foundry Co. has sold 200 tons of pipe to the University of New Hampshire and 200 tons to Silas Mason & Co. for a local job. The Donaldson Iron Co. has been awarded 190 tons of 30-in. pipe by Lawrence, Mass., and the Warren Foundry Co. of New England, Inc., will furnish 100 tons of 12-in. to Whitman, Mass. The local foundry is low bidder on 600 tons of 30 to 42-in. pipe required by Braintree, Mass., but no award has been made. The price situation appears a little more stable.

Warehouse Business

Machine bolts, carriage bolts and lag screws in full packages from stock are now 70 per cent off list, contrasted with 65 and 5 per cent heretofore. For direct mill shipment, the discount is now 70, 10 and 10 per cent, subject to manufacturers' extras. From stock in broken packages, the discount is now 60 per cent. Sink bolts are 60 and 10 per cent discount, against 50 and 10 per cent heretofore. Wood screws are cheaper, now being 25 and 10 per cent off, and common blue carpet tacks are lower at 60 and 10 per cent off. Wire brads from stock are quoted at 70 and 10 per cent discount and 75 per cent discount on factory shipments, a slight advance.

Old Material

Conditions are about as unsatisfactory as at any time during the business depression, it being difficult either to buy or sell material. A Bridgeport, Conn., user of No. 1 heavy melting steel has withdrawn from the market. The American Steel

& Wire Co., Worcester, Mass., is still paying \$7 a ton, delivered, for that material, and \$5.50 a ton for long

bundled skeleton, and recently paid as high as \$7.50 a ton for railroad steel.

Discusses Anti-Trust Legislation and Labor Rotation at Pittsburgh Coal Conference

PITTSBURGH, Nov. 16.—Striking pronouncements on the current agitation toward modification of the Sherman law and also on the rotation of labor were made today by Myron C. Taylor, chairman of the finance committee of the United States Steel Corporation, in an address of broad scope on "The Importance of Coal to Civilization" before the third international conference on bituminous coal at the Carnegie Institute of Technology. Mr. Taylor discussed also the economic status of the coal industry, gave a bright picture of the future of our machine-made civilization and dwelt on the lessons of international relations as bearing on the humane rather than the commercial.

Lesson of Rotating Labor

"The rotation of labor forces and the giving to each worker as great a portion as possible of such work as was going, has brought us to realize," said he, "that as volume expands or diminishes we have established a new and very important and flexible rule involving production; that this rule has come to stay; that, quite contrary to general belief, as affecting all time and piece workers in industry, the rotating of normal forces in proportion needed to accomplish the work to be done, has resulted in no lack of economy of operation. This is one of the fruits of our present depression which will influence productive operations for all time."

Cannot Legislate Against Law of Supply and Demand

In respect to legislation in connection with the anti-trust laws, he confessed to finding "it extremely hard to believe that constructive, cooperative plans sincerely undertaken for rationally adjusting production to demand in a basic industry, and which avoid any attempt artificially to fix or control prices, can be regarded as in restraint of trade and commerce when their sole purpose and effect would be to remove the existing vital impairments of production, trade and commerce, and to promote the public interests."

And later on, he added: "It cannot be too strongly emphasized that if any plan for the amelioration of our present economic difficulties does not harmonize with the law of supply and demand, it is due to fail, even though temporary stimulation or apparent stabilization may be in evidence. . . .

Theorists have attempted to set up all sorts of formulae that would take from life most of its uncertainties. They do not realize perhaps that they would take out of life its chief elixir, the element of competition, the reward of the energetic and patient and far-sighted, and they would have a tendency to make of life a humdrum."

Piping Pulverized Coal

Transportation of pulverized coal in pipe lines, with the attendant possibility of a vast new market for line pipe, was discussed by Friedrich Schulte, director of the Association of Supervisors of the Power Industry of the Ruhr District, Essen, Germany. Mr. Schulte pointed out that this movement has been accomplished almost entirely by pneumatic methods in Germany, which had heretofore been applied to the transportation of other bulk materials, such as grain and ashes. "Suction operation is generally preferable," said Mr. Schulte, "but it can only be used for short distances. Pressure must be used for greater distances, but such can be used only up to 2000 yards. For still greater distances intermediate stations must be installed. In many cases suction and pressure operations are combined."

United States Engineer Office, Rock Island, Ill., will receive bids until Dec. 18 for constructing roller-gate dam, power house and other structures at lock and dam No. 15, Mississippi River, including 2,884,154 lb. structural steel, 372,856 lb. nickel steel, 10,001,167 lb. reinforcing rods, 12,178 lb. forgings, 30,961 lb. iron castings, 113,489 lb. steel castings, 15,040 lb. nickel steel castings, 63,413 lb. bolts, 10,800 lb. 18-in. cast iron pipe, 60,800 lb. 30-in. cast iron pipe, 15,282 lb. 36-in. cast iron pipe, three hand-operated sluice gates, two electric-operated sluice gates, locomotive crane, bridge crane unit, roller gates and other equipment (Circular 68).

Ames Baldwin Wyoming Shovel Co., North Easton, Mass., recently organized by the merger of five leading shovel manufacturers, has appointed Norbert T. Jacobs, general sales manager, and C. B. Steffey, assistant general sales manager.

Non-Ferrous Markets Quiet But Firm; Good Prospect for Copper Curtailment

NEW YORK, Nov. 17.—Domestic sales of electrolytic copper have been in fair volume during the past week, with the quotation unchanged at 7c., delivered Connecticut Valley. Custom smelters are still the leading domestic sellers, but primary producers are increasingly willing to furnish copper to their customers at the current delivered price of 7c. a lb.

With the international conferences in New York still promising some success in limiting world copper output and with export sales substantial, the price is being held. Should the effort to restrict world production meet with even moderate success, an active buying movement from abroad is expected, but, if an agreement is not reached, it is suggested that an even lower market level than the present may result.

The foreign and domestic delegates to the conference are understood to have reached a satisfactory basis for agreement in the case of all of the large interests and also among the small producers in Rhodesia, which loom as large potential contributors to the world's supply in the future. It apparently remains to iron out differences of opinion on quotas and to gain adherence of small domestic copper companies, some of which have high costs and prefer a tariff to any other action.

Foreign buying has continued through the week, with the price of Copper Exporters, Inc., unchanged at 7.50c., delivered usual European ports. Total export sales for the month, including 1900 tons on Nov. 16, are about 17,000 tons. Lake copper is quiet and prices unchanged at 7.25c. to 7.37½c., delivered.

Tin

Buying by domestic tin consumers continued through last week, but the market resumed its previous dullness yesterday and today. Prices are firm and have advanced from 23c. a lb. on Nov. 11 to 23.25c., today. The buying movement, however, has been halted by the recent weakness in the silver market, and buyers are inclined to delay action awaiting conclusion of the international copper conferences, believing that tin as well as other metals may be sympathetically affected by the course of copper. Quotations in the London market today were £134 5s. a ton for spot standard, £136 5s. for future standard, £137 for spot Straits, and the Singapore price is £139 5s. United Kingdom stocks have increased again this week, totaling

30,573 tons, an addition of 320 tons. No shipments were made from Liverpool to the United States. Shipments of tin from the Straits to Nov. 15, have been 2862 tons, a somewhat smaller total than has been usual recently for a half month.

Lead

Prices are steady at 4.05c., New York, and 3.90c., St. Louis, with most buying limited to carload lots for prompt shipment. Sellers estimate that two-thirds to three-quarters of December needs have been covered, indicating that buyers have more confidence in the future course of prices than in many months. The London parity is today at 4.62c., which gives sellers here a margin of 57 points for an advance.

Zinc

Following the recent moderate buy-

ing movement, which served to advance prices to 3.30c., East St. Louis, and 3.65c., New York, the zinc market has settled down to occasional small buying for prompt shipment. Small business is appearing for December delivery, but with sellers asking 3.32½c., St. Louis, for January, buyers do not show much interest, as some have already covered for this shipment at the former lower market level.

Antimony

Fluctuation in the silver market, which would customarily affect quotations on antimony, have not served to change prices greatly because of the small demand. The Chinese metal and the domestic product are quoted at 6.75c., duty paid, New York, a decline of 10 points from the price a week ago.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 17	Nov. 16	Nov. 14	Nov. 13	Nov. 12	Nov. 11
Lake copper, New York.....	7.37½	7.37½	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.....	6.75	6.75	6.75	6.75	6.75	6.75
Straits tin, spot, N. Y.....	23.25	23.20	—	23.00	23.10	23.00
Zinc, East St. Louis.....	3.30	3.30	3.30	3.30	3.25	3.25
Zinc, New York.....	3.65	3.65	3.65	3.65	3.60	3.60
Lead, St. Louis.....	3.90	3.90	3.90	3.90	3.90	3.90
Lead, New York.....	4.05	4.05	4.05	4.05	4.05	4.05

*Refinery quotation; price ¼c. higher delivered in the Connecticut valley.

Aluminum, 98 to 99 per cent pure, 22.50c. a lb. delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.75c. a lb., New York.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	13.00c.
*Copper, hot rolled, base sizes, 1000 lb. and more.....	16.12½c.
Seamless Tubes—	
Brass.....	16.25c.
Copper.....	15.62½c.
Brass Rods.....	10.75c.
Welded Brass Tubes.....	21.75c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Price, Base per Lb.

Zinc sheets (No. 9), casks 9.25c. to 9.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	25.75c. to 26.75c.
Tin, bar.....	27.75c. to 29.75c.
Copper, Lake.....	9.00c. to 10.00c.
Copper, electrolytic.....	8.50c. to 9.00c.
Copper, casting.....	8.25c. to 8.75c.
Zinc, slab.....	4.75c. to 5.25c.
Lead, American pig.....	4.75c. to 5.00c.
Lead, bar.....	6.50c. to 7.50c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	20.00c. to 23.00c.
Alum. ingots, No. 12 alloy.....	17.00c. to 18.00c.
Rabbit metal, commercial grade.....	19.00c. to 20.00c.
Solder, ½ and ¾.....	16.75c. to 17.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	27.25c.
Tin, bar.....	29.25c.
Copper, Lake.....	8.37½c.
Copper, electrolytic.....	8.37½c.
Copper, castings.....	8.00c.
Zinc, slab.....	5.00c.
Lead, American pig.....	4.60c. to 4.75c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Rabbit metal, medium grade.....	15.00c.
Rabbit metal, high grade.....	21.25c.
Solder, ½ and ¾.....	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (All prices are nominal because of uncertain condition of market.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	5.25c.	6.00c.
Copper, hvy. and wire.....	5.00c.	5.75c.
Copper, light and bottoms.....	4.25c.	5.00c.
Brass, heavy.....	2.75c.	3.50c.
Brass, light.....	2.25c.	3.00c.
Hvy. machine composition.....	4.00c.	4.75c.
No. 1 yel. brass turnings.....	3.00c.	3.50c.
No. 1 red brass or compos. turnings.....	3.75c.	4.50c.
Lead, heavy.....	3.00c.	3.50c.
Zinc.....	1.25c.	1.75c.
Sheet aluminum.....	9.00c.	11.00c.
Cast aluminum.....	3.25c.	5.00c.

▲▲ Semi-Finished Steel, Coke, Coal, Bolts, Cast Iron Pipe ▲▲

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms		Sheet Bars		Skelp	
	Per Gross Ton	(Open-Hearth or Bessemer)	Per Gross Ton	(F.o.b. Pittsburgh or Youngstown)	Per Lb.
Revolving, 4-in. and under 10-in., Pitts-		Pittsburgh	\$29.00	Grooved	1.60c
burgh	\$29.00	Youngstown	29.00	Universal	1.60c
Revolving, 4-in. and under 10-in., Youngs-		Cleveland	29.00	Sheared	1.60c
town	29.00				
Revolving, 4-in. and under 10-in., Cleve-					
land	29.00				
Revolving, 4-in. and under 10-in., Chicago ..	31.00				
Forcing quality, Pittsburgh	35.00				

PRICES OF COKE, COAL AND FUEL OIL

Coke		Coal		Fuel Oil	
	Per Net Ton		Per Net Ton		Per Gal. f.o.b. Bayonne, N. J.
Furnace, f.o.b. Connellsville		Foundry, by-product, Phila.	9.00	Gas coal, 3 $\frac{1}{2}$ -in., f.o.b. Pa. mines...	1.70 to 1.80
prompt	\$2.40	Foundry, Birmingham	5.00	Mine run gas coal, f.o.b. Pa. mines...	1.50 to 1.60
Foundry, f.o.b. Connellsville		Foundry, by-product, St. Louis ..	8.00	Steam slack, f.o.b. W. Pa. mines...	.30 to .40
prompt	\$3.25 to 4.50	f.o.b. ovens	9.00	Gas slack, f.o.b. W. Pa. mines...	.50 to .70
Foundry, by-product, Ch'go ovens	7.50	Foundry, by-product, del'd St. Louis	9.00		
Foundry, by-product, New Eng-					
land, del'd	10.50				
Foundry, by-product, Newark or					
Jersey City, delivered	8.70 to 9.10				

PRICES OF FLUXES AND REFRACTORIES

Fluorspar		Fire Clay Brick		Silica Brick	
	Per Net Ton		Per 1000 f.o.b. Works		Per 1000 f.o.b. Works
Domestic, 85% and over calcium fluoride,		High-Heat	Intermediate	Pennsylvania	\$40.00
not over 5% silicon, gravel, f.o.b. Illinois		Duty Brick	Heavy Duty Brick	Chicago	49.00
and Kentucky mines	\$13.00			Birmingham	50.00
No. 2 lump, Illinois and Kentucky mines...	17.00	Pennsylvania	\$40.00 to \$35.00	Silica clay, per ton	8.00
Foreign, 85% calcium fluoride, not over		Maryland	40.00 to 35.00		
5% silicon, v.i.f. Atlantic port, duty		New Jersey	\$44.00 to 59.00		
paid	17.00	Ohio	40.00 to 35.00		
Domestic, No. 1 ground bulk, 95 to 98%		Kentucky	40.00 to 35.00		
calcium fluoride, not over 2 $\frac{1}{2}$ % silicon,		Missouri	37.00 to 35.00		
f.o.b. Illinois and Kentucky mines	32.00	Illinois	40.00 to 35.00		
		Ground fire clay,	per ton		
			6.50		

PRICES OF CAST IRON PIPE

	Per Net Ton		Per Net Ton
6-in. and larger, del'd Chicago	\$10.00 to \$14.00	6-in. and larger, del'd New York ..	32.00
4-in., del'd Chicago	43.00 to 47.00	4-in., del'd New York	35.00
		6-in. and larger, Birmingham	33.00 to 34.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts		Bolts and Nuts		Small Rivets	
	Per Cent Off List		Per Cent Off List		Per Cent Off List
(Each, Pittsburgh, Cleveland, Birmingham or		Semi-finished hexagons nuts,	73, 10 and 10	($\frac{1}{8}$ -in. and smaller)	
Chicago)		Semi-finished hexagons castellated nuts, S.A.E.,	73, 10 and 10		
Machine bolts	73, 10 and 10	Stove bolts in packages, P'gh.	80, 10, 10, 10 and 5	F.o.b. Pittsburgh	70, 10 and 5
Carriage bolts	73, 10 and 10	Stove bolts in packages, Ch'go.	80, 10, 10, 10 and 5	F.o.b. Cleveland	70, 10 and 5
Lar bolts	73, 10 and 10	Stove bolts in pkgs., Cleveland ..	80, 10, 10, 10 and 5	F.o.b. Chicago	70, 10 and 5
Flaw bolts, Nos. 1, 2, 3 and 7 heads, 73, 10 and 10		Stove bolts in bulk, P'gh.	80, 10, 10, 10, 5 and 2 $\frac{1}{2}$		
Hot-pressed nuts, blank or tapped, square,		Stove bolts in bulk, Ch'go.	80, 10, 10, 10, 5 and 2 $\frac{1}{2}$		
73, 10 and 10		Stove bolts in bulk, Cleveland ..	80, 10, 10, 10, 5 and 2 $\frac{1}{2}$		
Hot-pressed nuts, blank or tapped, hexagons,		Tire bolts	80, 10, 10, 10, 5 and 2 $\frac{1}{2}$		
73, 10 and 10			60, 10 and 10		
C.p.e. and t. square or hex. nuts, blank or					
tapped	73, 10 and 10				
Washers*	7.00c. to 6.75c. per lb. off list				

*Each, Chicago, New York and Pittsburgh.
 †Bolts with rolled thread up to and including
 3 in. x 6 in. take 10 per cent lower list prices.

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
Pittsburgh mill.....	1.60c.
Chicago.....	1.70c.
Philadelphia.....	1.89c.
New York.....	1.93c.
Cleveland.....	1.65c.
Lackawanna.....	1.70c.
Birmingham.....	1.70c.
Pacific ports.....	2.00c.

Billet Steel Reinforcing

P'gh mills, 40, 50, 60-ft.....	1.60c.
Birmingham, mill lengths.....	1.75c.
Cleveland.....	1.50c. to 1.55c.

Rail Steel

P'gh mills, east of Chicago dist.....	1.30c. to 1.35c.
Chicago Heights mill.....	1.50c. to 1.60c.
Del'd Philadelphia.....	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
Pittsburgh mill.....	1.60c.
Chicago.....	1.70c.
Birmingham.....	1.70c.
Cleveland.....	1.78½c.
Philadelphia.....	1.78½c.
Cottsville.....	1.70c.
Sparrows Point.....	1.70c.
Lackawanna.....	1.70c.
Del'd New York.....	1.88c.
Pacific ports.....	1.85c. to 1.90c.

Structural Shapes

	Base per Lb.
Pittsburgh mill.....	1.60c.
Chicago.....	1.70c.
Birmingham.....	1.70c.
Lackawanna.....	1.70c.
Bethlehem.....	1.70c.
Cleveland.....	1.78½c.
Philadelphia.....	1.69½c.
Del'd New York.....	1.85½c.
Pacific ports.....	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh.....	1.60c. to 1.65c.
Wider than 6 in., P'gh.....	1.50c. to 1.55c.
6 in. and narrower, Chicago.....	1.70c. to 1.75c.
Wider than 6 in., Chicago.....	1.60c. to 1.65c.
Common stock, P'gh.....	1.75c. to 1.85c.
Coverage stock, Chicago.....	1.85c. to 1.95c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.05c. to 2.15c.
Strips, Cleveland.....	2.05c. to 2.15c.
Strips, del'd Chicago.....	2.33c.
Strips, Worcester.....	2.30c.
Rebar stock, No. 20 gage, Pittsburgh or Cleveland.....	3.10c. to 3.20c.

*According to size.

Wire Products

	Base per Lb.
Overhead lots, f.o.b. Pittsburgh and Cleveland	
To Manufacturing Trade	
Bright wire.....	2.20c.
Spring wire.....	3.20c.

To Jobbing Trade

	Base per Kea
Standard wire nails.....	\$1.90
Smooth coated nails.....	1.90
Galvanized nails.....	3.90

To Retail Trade

	Base per Lb.
Smooth annealed wire.....	2.35c.
Smooth galvanized wire.....	2.80c.
Polished staples.....	2.35c.
Galvanized staples.....	2.60c.
Barbed wire, galvanized.....	2.55c.

Woven wire fence, Nos. 9 and 11 gage, per net ton.....	\$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton.....	60.00

	Base per Kea
Standard wire nails.....	\$2.00
Smooth coated nails.....	2.00
Galvanized nails.....	4.00

	Base per Lb.
Smooth annealed wire.....	2.45c.
Smooth galvanized wire.....	2.90c.
Polished staples.....	2.45c.
Galvanized staples.....	2.70c.
Barbed wire, galvanized.....	2.65c.

Woven wire fence, Nos. 9 and 11 gage, per net ton.....	\$60.00
Woven wire fence, 12½ gage and lighter, per net ton.....	65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.	
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Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh.....	1.70c.
No. 10, f.o.b. Chicago mills.....	1.80c.
No. 10, del'd Philadelphia.....	1.99c.
No. 10, f.o.b. Birmingham.....	1.85c.
No. 10, c.i.f. Pacific Coast ports.....	2.33c.

Hot-Rolled and Annealed

No. 10, Pittsburgh.....	1.85c.
No. 10, Chicago mills.....	1.95c.
No. 10, Birmingham.....	2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh.....	2.40c.
No. 24, f.o.b. Chicago mills.....	2.50c.
No. 24, del'd Philadelphia.....	2.69c.
No. 24, f.o.b. Birmingham.....	2.55c.
No. 24, c.i.f. Pacific Coast ports.....	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh.....	2.35c.
No. 10 gage, f.o.b. Chicago mills.....	2.45c.
No. 10 gage, del'd Philadelphia.....	2.64c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh.....	2.95c.
No. 20 gage, f.o.b. Chicago mills.....	3.05c.
No. 20 gage, del'd Philadelphia.....	3.24c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.10c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh.....	2.75c.
No. 20, f.o.b. Pittsburgh.....	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago mills.....	3.00c.
No. 24, del'd Philadelphia.....	3.19c.
No. 24, f.o.b. Birmingham.....	3.05c.
No. 24, c.i.f. Pacific Coast ports.....	3.38c.

Long Terns

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh.....	3.15c.
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Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh.....	2.90c.
No. 20, f.o.b. Pittsburgh.....	3.40c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.65c.
No. 28, Chicago mills.....	2.75c.

Tin Plate

	Base per Bar
Standard cokes, f.o.b. P'gh district mills.....	\$4.75
Standard cokes, f.o.b. Gary.....	4.85

Terne Plate

	(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 25 in.)	
8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

	Alloy Quantity Bar Base, 2.65c. per Lb.
S.A.E. Series	Differential per 100 Lb.
2000 (1½% Nickel).....	\$0.25
2100 (1½% Nickel).....	0.55
2300 (3½% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ¾-in. and larger.....	\$2.70
Spikes, ½ in. and larger.....	2.70
Spikes, boat and barge.....	2.90
Tie plate, steel.....	1.85
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

	Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
Butt Weld	
Inches	Steel Black Galv.
1½ to 2.....	47 21½ 1½ and 2 +11 +36
2 to 3.....	53 27½ 2½ and 3 +11 +36
3 to 4.....	58 44½ 3½ and 4 +11 +36
4 to 5.....	62 50½ 4½ and 5 +11 +36
5 to 6.....	64 52½ 5½ and 6 +11 +36
6 to 8.....	57 45½ 6½ and 8 +11 +36
8 to 10.....	61 49½ 8½ and 10 +11 +36
10 and 12.....	58 45½ 10½ and 12 +11 +36
12 and 14.....	56 43½ 12½ and 14 +11 +36
14 and 16.....	55 42½ 14½ and 16 +11 +36
16 and 18.....	54 41½ 16½ and 18 +11 +36
18 and 20.....	53 40½ 18½ and 20 +11 +36
20 and 24.....	52 39½ 20½ and 24 +11 +36
24 and 30.....	51 38½ 24½ and 30 +11 +36
30 and 36.....	50 37½ 30½ and 36 +11 +36
36 and 42.....	49 36½ 36½ and 42 +11 +36
42 and 48.....	48 35½ 42½ and 48 +11 +36
48 and 54.....	47 34½ 48½ and 54 +11 +36
54 and 60.....	46 33½ 54½ and 60 +11 +36
60 and 66.....	45 32½ 60½ and 66 +11 +36
66 and 72.....	44 31½ 66½ and 72 +11 +36
72 and 78.....	43 30½ 72½ and 78 +11 +36
78 and 84.....	42 29½ 78½ and 84 +11 +36
84 and 90.....	41 28½ 84½ and 90 +11 +36
90 and 96.....	40 27½ 90½ and 96 +11 +36
96 and 102.....	39 26½ 96½ and 102 +11 +36
102 and 108.....	38 25½ 102½ and 108 +11 +36
108 and 114.....	37 24½ 108½ and 114 +11 +36
114 and 120.....	36 23½ 114½ and 120 +11 +36
120 and 126.....	35 22½ 120½ and 126 +11 +36
126 and 132.....	34 21½ 126½ and 132 +11 +36
132 and 138.....	33 20½ 132½ and 138 +11 +36
138 and 144.....	32 19½ 138½ and 144 +11 +36
144 and 150.....	31 18½ 144½ and 150 +11 +36
150 and 156.....	30 17½ 150½ and 156 +11 +36
156 and 162.....	29 16½ 156½ and 162 +11 +36
162 and 168.....	28 15½ 162½ and 168 +11 +36
168 and 174.....	27 14½ 168½ and 174 +11 +36
174 and 180.....	26 13½ 174½ and 180 +11 +36
180 and 186.....	25 12½ 180½ and 186 +11 +36
186 and 192.....	24 11½ 186½ and 192 +11 +36
192 and 198.....	23 10½ 192½ and 198 +11 +36
198 and 204.....	22 9½ 198½ and 204 +11 +36
204 and 210.....	21 8½ 204½ and 210 +11 +36
210 and 216.....	20 7½ 210½ and 216 +11 +36
216 and 222.....	19 6½ 216½ and 222 +11 +36
222 and 228.....	18 5½ 222½ and 228 +11 +36
228 and 234.....	17 4½ 228½ and 234 +11 +36
234 and 240.....	16 3½ 234½ and 240 +11 +36
240 and 246.....	15 2½ 240½ and 246 +11 +36
246 and 252.....	14 1½ 246½ and 252 +11 +36
252 and 258.....	13 ½ 252½ and 258 +11 +36
258 and 264.....	12 ¼ 258½ and 264 +11 +36
264 and 270.....	11 1/8 264½ and 270 +11 +36
270 and 276.....	10 1/16 270½ and 276 +11 +36
276 and 282.....	9 1/32 276½ and 282 +11 +36
282 and 288.....	8 1/64 282½ and 288 +11 +36
288 and 294.....	7 1/128 288½ and 294 +11 +36
294 and 300.....	6 1/256 294½ and 300 +11 +36
300 and 306.....	5 1/512 300½ and 306 +11 +36
306 and 312.....	4 1/1024 306½ and 312 +11 +36
312 and 318.....	3 1/2048 312½ and 318 +11 +36
318 and 324.....	2 1/4096 318½ and 324 +11 +36
324 and 330.....	1 1/8192 324½ and 330 +11 +36
330 and 336.....	1/16384 330½ and 336 +11 +36
336 and 342.....	1/32768 336½ and 342 +11 +36
342 and 348.....	1/65536 342½ and 348 +11 +36
348 and 354.....	1/131072 348½ and 354 +11 +36
354 and 360.....	1/262144 354½ and 360 +11 +36
360 and 366.....	1/524288 360½ and 366 +11 +36
366 and 372.....	1/1048576 366½ and 372 +11 +36
372 and 378.....	1/2097152 372½ and 378 +11 +36
378 and 384.....	1/4194304 378½ and 384 +11 +36
384 and 390.....	1/8388608 384½ and 390 +11 +36
390 and 396.....	1/16777216 390½ and 396 +11 +36
396 and 402.....	1/33554432 396½ and 402 +11 +36
402 and 408.....	1/67108864 402½ and 408 +11 +36
408 and 414.....	1/134217728 408½ and 414 +11 +36
414 and 420.....	1/268435456 414½ and 420 +11 +36
420 and 426.....	1/536870912 420½ and 426 +11 +36
426 and 432.....	1/1073741824 426½ and 432 +11 +36
432 and 438.....	1/2147483648 432½ and 438 +11 +36
438 and 444.....	1/4294967296 438½ and 444 +11 +36
444 and 450.....	1/8589934592 444½ and 450 +11 +36
450 and 456.....	1/17179869184 450½ and 456 +11 +36
456 and 462.....	1/34359738368 456½ and 462 +11 +36
462 and 468.....	1/68719476736 462½ and 468 +11 +36
468 and 474.....	1/137438953472 468½ and 474 +11 +36
474 and 480.....	1/274877906944 474½ and 480 +11 +36
480 and 486.....	1/549755813888 480½ and 486 +11 +36
486 and 492.....	1/1099511627776 486½ and 492 +11 +36
492 and 498.....	1/2199023255552 492½ and 498 +11 +36
498 and 504.....	1/4398046511104 498½ and 504 +11 +36
504 and 510.....	1/8796093022208 504½ and 510 +11 +36
510 and 516.....	1/17592186044416 510½ and 516 +11 +36
516 and 522.....	1/35184372088832 516½ and 522 +11 +36
522 and 528.....	1/70368744177664 522½ and 528 +11 +36
528 and 534.....	1/140737488355328 528½ and 534 +11 +36
534 and 540.....	1/281474976710656 534½ and 540 +11 +36
540 and 546.....	1/562949953421312 540½ and 546 +11 +36
546 and 552.....	1/1125899906842624 546½ and 552 +11 +36
552 and 558.....	1/2251799813685248 552½ and 558 +11 +36
558 and 564.....	1/4503599627370496 558½ and 564 +11 +36
564 and 570.....	1/9007199254740992 564½ and 570 +11 +36
570 and 576.....	1/18014398509481984 570½ and 576 +11 +36
576 and 582.....	1/36028797018963968 576½ and 582 +11 +36
582 and 588.....	1/72057594037927936 582½ and 588 +11 +36
588 and 594.....	1/144115188075855872 588½ and 594 +11 +36
594 and 600.....	1/288230376151711744 594½ and 600 +11 +36
600 and 606.....	1/576460752303423488 600½ and 606 +11 +36
606 and 612.....	1/1152921504606846976 606½ and 612 +11 +36
612 and 618.....	1/2305843009213693952 612½ and 618 +11 +36
618 and 624.....	1/4611686018427387904 618½ and 624 +11 +36
624 and 630.....	1/9223372036854775808 624½ and 630 +11 +36
630 and 636.....	1/18446744073709551616 630½ and 636 +11 +36
636 and 642.....	1/36893488147419103232 636½ and 642 +11 +36
642 and 648.....	1/73786976294838206464 642½ and 648 +11 +36
648 and 654.....	1/147573952589676412928 648½ and 654 +11 +36
654 and 660.....	1/295147905179352825856 654½ and 660 +11 +36
660 and 666.....	1/590295810358705651712 660½ and 666 +11 +36
666 and 672.....	1/1180591620717411303424 666½ and 672 +11 +36
672 and 678.....	1/2361183241434822606848 672½ and 678 +11 +36
678 and 684.....	1/4722366482869645213696 678½ and 684 +11 +36
684 and 690.....	1/9444732965739290427392 684½ and 690 +11 +36
690 and 696.....	1/18889465931478580854784 690½ and 696 +11 +36
696 and 702.....	1/37778931862957161709568 696½ and 702 +11 +36
702 and 708.....	1/75557863725914323419136 702½ and 708 +11 +36
708 and 714.....	1/151115727451828646838272 708½ and 714 +11 +36
714 and 720.....	1/302231454903657293676544 714½ and 720 +11 +36
720 and 726.....	1/604462909807314587353088 720½ and 726 +11 +36
726 and 732.....	1/1208925819614629174706176 726½ and 732 +11 +36
732 and 738.....	1/2417851639229258349412352 732½ and 738 +11 +36
738 and 744.....	1/4835703278458516698824704 738½ and 744 +11 +36
744 and 750.....	1/9671406556917033397649408 744½ and 750 +11 +36
750 and 756.....	1/19342813113834066795298816 750½ and 756 +11 +36
756 and 762.....	1/38685626227668133590597632 756½ and 762 +11 +36
762 and 768.....	1/77371252455336267181195264 762½ and 768 +11 +36
768 and 774.....	1/154742504910672534362390528 768½ and 774 +11 +36
774 and 780.....	1/309485009821345068724781056 774½ and 780 +11 +36
780 and 786.....	1/618970019642690137449562112 780½ and 786 +11 +36
786 and 792.....	1/1237940039285380274899124224 786½ and 792 +11 +36
792 and 798.....	1/2475880078570760549798248448 792½ and 798 +11 +36
798 and 804.....	1/4951760157141521099596496896 798½ and 804 +11 +36
804 and 810.....	1/9903520314283042199192993792 804½ and 810 +11 +36
810 and 816.....	1/19807040628566084398385987584 810½ and 816 +11 +36
816 and 822.....	1/39614081257132168796771975168 816½ and 822 +11 +36
822 and 828.....	1/79228162514264337593543950336 822½ and 828 +11 +36
828 and 834.....	1/158456325028528675187087900672 828½ and 834 +11 +36
834 and 840.....	1/316912650057057350374175801344 834½ and 840 +11 +36
840 and 846.....	1/633825300114114700748351602688 840½ and 846 +11 +36
846 and 852.....	1/1267650600228229401496703205376 846½ and 852 +11 +36
852 and 858.....	1/2535301200456458802993406410752 852½ and 858 +11 +36
858 and 864.....	1/5070602400912917605986812821504 858½ and 864 +11 +36
864 and 870.....	1/10141204801825835211973625643008 864½ and 870 +11 +36
870 and 876.....	1/20282409603651670423947251286016 870½ and 876 +11 +36
876 and 882.....	1/40564819207303340847894502572032 876½ and 882 +11 +36
882 and 888.....	1/81129638414606681695789005144064 882½ and 888 +11 +36
888 and 894.....	1/162259276829213363391578010288128 888½ and 894 +11 +36
894 and 900.....	1/324518553658426726783156020576256 894½ and 900 +11 +36
900 and 906.....	1/649037107316853453566312041152512 900½ and 906 +11 +36
906 and 912.....	1/1298074214633706907132624082305024 906½ and 912 +11 +36
912 and 918.....	1/2596148429267413814265248164610048 912½ and 918 +11 +36
918 and 924.....	1/5192296858534827628530496329220096 918½ and 924 +11 +36
924 and 930.....	1/10384593717069655257060992658440192 924½ and 930 +11 +36
930 and 936.....	1/20769187434139310514121985316880384 930½ and 936 +11 +36
936 and 942.....	1/41538374868278621028243970633760768 936½ and 942 +11 +36
942 and 948.....	1/83076749736557242056487941267521536 942½ and 948 +11 +36
948 and 954.....	1/166153499473114484112975882535043072 948½ and 954 +11 +36
954 and 960.....	1/332306998946228968225951765070086144 954½ and 960 +11 +36
960 and 966.....	1/664613997892457936451903530140172288 960½ and 966 +11 +36
966 and 972.....	1/1329227995784915872903807060280344576 966½ and 972 +11 +36
972 and 978.....	1/2658455991569831745807614120560689152 972½ and 978 +11 +36
978 and 984.....	1/5316911983139663491615228241121378304 978½ and 984 +11 +36
984 and 990.....	1/10633823966279326983230456482242756608 984½ and 990 +11 +36
990 and 996.....	1/21267647932558653966460912964485513216 990½ and 996 +11 +36
996 and 1002.....	1/42535295865117307932921825928971026432 996½ and 1002 +11 +36
1002 and 1008.....	1/85070591730234615865843651857942052864 1002½ and 1008 +11 +36
1008 and 1014.....	1/170141183460469231731687303715884105728 1008½ and 1014 +11 +36
1014 and 1020.....	1/340282366920938463463374607431768211456 1014½ and 1020 +11 +36
1020 and 1026.....	1/680564733841876926926749214863536422912 1020½ and 1026 +11 +36
1026 and 1032.....	1/1361129467683753853853498429727072845824 1026½ and 1032 +11 +36
1032 and 1038.....	1/2722258935367507707706996859454145691648 1032½ and 1038 +11 +36
1038 and 1044.....	1/5444517870735015415413993718908291383296 1038½ and 1044 +11 +36
1044 and 1050.....	1/10889035741470030830827987437816582766592 1044½ and 1050 +11 +36
1050 and 1056.....	1/21778071482940061661655974875633165533184 1050½ and 1056 +11 +36
1056 and 1062.....	1/43556142965880123323311949751266331066368 1056½ and 1062 +11 +36
1062 and 1068.....	1/87112285931760246646623899502532662132736 1062½ and 1068 +11 +36
1068 and 1074.....	1/174224571863520493293247799005065324265472 1068½ and 1074 +11 +36
1074 and 1080.....	1/348449143727040986586495598010130648530944 1074½ and 1080 +11 +36
1080 and 1086.....	1/696898287454081973172991196020261297061888 1080½ and 1086 +11 +36
1086 and 1092.....	1/1393796574908163946345982392040522594123776 1086½ and 1092 +11 +36
1092 and 1098.....	1/2787593149816327892691964784081045188247552 1092½ and 1098 +11 +36
1098 and 1104.....	1/5575186299632655785383929568162090376495104 1098½ and 1104 +11 +36
1104 and 1110.....	1/11150372599265311570767859136324180752990208 1104½ and 1110 +11 +36
1110 and 1116.....	1/22300745198530623141535718272648361505980416 1110½ and 1116 +11 +36
1116 and 1122.....	1/44601490397061246283071436545296723011960832 1116½ and 1122 +11 +36
1122 and 1128.....	1/89202980794122492566142873090593446023921664 1122½ and 1128 +11 +36
1128 and 1134.....	1/178405961588244985132285746181186892047843328 1128½ and 1134 +11 +36
1134 and 1140.....	1/356811923176489970264571492362373784095686656 1134½ and 1140 +11 +36
1140 and 1146.....	1/713623846352979940529142984724747568191373312 1140½ and 1146 +11 +36
1146 and 1152.....	1/1427247692705959881058285969449495136382746624 1146½ and 1152 +11 +36
1152 and 1158.....	1/2854495385411919762116571938898990272765493248 1152½ and 1158 +11 +36
1158 and 1164.....	1/5708990770823839524233143877797980545530986496 1158½ and 1164 +11 +36
1164 and 1170.....	1/11417981541647679048466287755595961091061972992 1164½ and 1170 +11 +36
1170 and 1176.....	1/22835963083295358096932575511191922182123945984 1170½ and 1176 +11 +36
1176 and 1182.....	1/456719

Pig Iron Prices for All Districts

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	\$15.00
Bessemer	16.50
Gray forge	16.00
No. 2 foundry	16.00
No. 3 foundry	16.50
Malleable	16.50
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$15.50 to \$16.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	\$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil.	1.50
S'th'n No. 2 fdy.	\$25.04 to 27.04
Low phos., sil. 1 to 2, cop-	17.01
per free	28.50 to 29.20
Silvery, sil. 8 per cent.	24.79
Bess. ferro-silicon, 14-15%	21.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	19.16
Southern No. 2 fdy., del'd	15.42
Northern malleable, del'd	19.16
Northern basic, del'd	19.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo No. 2, del'd east.	
N. J.	\$17.78 to \$18.28
East. Pa. No. 2 fdy.	16.89 to 17.39
East. Pa. No. 2X fdy.	17.89 to 18.39

Freight rates: \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	\$17.00
No. 2X fdy.	17.50
No. 1 fdy.	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$19.91
*Buffalo, sil. 2.25 to 2.75	19.91
*Ala., sil. 1.75 to 2.25	\$20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
*Ala., sil. 1.75 to 2.25	16.75
*Ala., sil. 2.25 to 2.75	17.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	\$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent.	23.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	\$15.51 to \$16.01
East. Pa. No. 2X	16.01 to 16.51
East. Pa. No. 1X	16.51 to 17.01
Basic (del'd east. Pa.)	16.25
Malleable	18.50 to 19.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain	22.64
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	\$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable (local delivery)	17.00
Ohio silvery, 8 per cent.	24.00
Stand. low phos., Valley	22.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Prices of Ores and Ferroalloys

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton	
Old range Bessemer, 51.50% iron	\$14.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58%	
iron, dry, Spanish or Algerian	8c. to 9c.
Iron, low phos., Swedish, aver. 68% iron	10.00c.
Iron, basic or foundry, Swedish, average 65% iron	9.00c.
Iron, basic and foundry, Russian, average 63% iron	9.00c.
Manganese, Caucasian, washed 82% .25c. to 26c.	
Manganese, African, Indian, 50-52% .23c. to 24c.	
Manganese, Brazilian, 46 to 48% .22c. to 23c.	
Tungsten, 60% concentrates	\$12.00 to \$12.50

Per Gross Ton

Chrome, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	22.50

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or gulf port, duty paid	\$80.00 to \$85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$28.00 to \$30.00
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Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00

Per Gross Ton Furnace

10%	\$35.00
11%	37.00

Per Gross Ton Furnace

12%	\$39.00
14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	
10%	\$22.00
11%	22.50
12%	23.50
Per Gross Ton	
13%	\$24.50
14%	26.50
15%	28.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton

6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
11%	21.50
12%	22.00
13%	22.50
14%	23.00
15%	23.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads, \$1.08

Ferrotungsten, less carloads, \$1.15 to 1.25

Ferrosilicon, 4 to 6% carbon and up, 65 to 70% cr., per lb. contained Cr. delivered, in carloads, 11.00c.

Ferrosilicon, 2% carbon, 17.00c. to 17.50c.

Ferrosilicon, 1% carbon, 19.00c. to 20.00c.

Ferrosilicon, 0.10% carbon, 24.50c. to 26.00c.

Ferrosilicon, 0.06% carbon, 26.50c. to 28.00c.

Ferrovandium, per lb. Va. furnace, \$3.15 to \$3.65

Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads, 160.00

Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton, 91.00

Ferromolybdenum, per lb. Mo., del., 1.00

Calcium molybdate, per lb. Mo., del., 85c.

Ferrophosphorus, electric, 24%, f.o.b. Aniston, Ala., per gross ton, \$122.50

Silico spiegel, per ton, f.o.b. furnace, car lots, 42.50

Ton lots or less, per ton, 47.50

Silico-manganese, gross ton, delivered:

2.50% carbon grade, 105.00

1% carbon grade, 115.00

Spot prices, \$5 a ton higher

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$10.00 to \$10.50
No. 2 heavy melting steel...	9.00 to 9.50
Scrap rails...	10.00 to 10.50
Compressed sheet steel...	9.75 to 10.25
Light bundled sheets...	9.00 to 9.50
Cast iron car wheels...	10.50 to 11.00
Sheet bar crops, ordinary...	11.00 to 11.50
Heavy breakable cast...	8.00 to 8.50
No. 2 railroad wrought...	10.00 to 10.50
Hot steel axle turnings...	9.25 to 9.75
Machine shop turnings...	7.00 to 7.50
Roller knuckles and couplers...	11.00 to 11.50
Roller coil and leaf springs...	11.00 to 11.50
Roller steel wheels...	11.00 to 11.50
Low phos. billet crops...	13.00 to 13.50
Low phos. plate scrap...	11.00 to 11.50
Low phos. sheet bar crops...	12.50 to 13.00
Heavy steel axle turnings...	9.00 to 9.50
Low phos. punchings...	12.50 to 13.00
Short shov. steel turnings...	7.00 to 7.50
Short mixed turnings or borings...	7.00 to 7.50
Steel car axles...	15.50 to 16.50
No. 1 cast...	9.50 to 10.50
Rails 3 ft. and under...	12.00 to 12.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel...	\$7.75 to \$8.25
Shoveling steel...	7.75 to 8.25
Frogs, switches and guards...	7.75 to 8.25
Factory hyd. comp. sheets...	6.00 to 6.50
Drop forge flashings...	5.50 to 6.00
No. 1 busheling...	5.50 to 6.00
Car wheels...	8.25 to 9.25
Railroad tires...	9.00 to 9.50
Railroad leaf springs...	9.50 to 10.00
Axle turnings...	6.00 to 6.50
Steel couplers and knuckles...	8.50 to 9.00
Coil springs...	9.50 to 10.00
Axle turnings...	6.00 to 6.50
Low phos. punchings...	10.00 to 10.50
Low phos. plates, 12 in. and under...	9.00 to 9.50
Cast iron borings...	4.00 to 4.50
Short shoveling turnings...	4.00 to 4.50
Machine shop turnings...	4.00 to 4.50
Rolling rails...	10.50 to 11.00
Steel rails, less than 3 ft....	9.25 to 9.75
Steel rails, less than 2 ft....	10.00 to 10.50
Angle bars, steel...	8.25 to 8.75
Cast iron car wheels...	8.50 to 9.00
Railroad malleable...	7.50 to 8.00
Agricultural malleable...	7.00 to 7.50
*Relaying rails, 56 to 60 lb. and up...	19.00 to 21.00
*Relay. rails, 65 lb. and up...	22.00 to 27.00

Per Net Ton

Iron angle and splice bars...	7.00 to 7.50
Iron arch bars, transoms...	7.50 to 8.00
Iron car axles...	13.50 to 14.50
Steel car axles...	10.50 to 11.00
No. 1 railroad wrought...	6.50 to 7.00
No. 2 railroad wrought...	6.75 to 7.25
No. 1 busheling...	5.00 to 5.50
No. 2 busheling...	4.00 to 4.50
Locomotive tires, smooth...	10.50 to 11.50
Pipes and flues...	3.50 to 4.00
No. 1 machinery cast...	8.50 to 9.00
No. 1 railroad cast...	7.00 to 7.50
No. 1 agricultural cast...	7.00 to 7.50
Stove plate...	6.25 to 6.75
Grate bars...	5.50 to 6.00
Brake shoes...	5.75 to 6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$7.50 to \$8.50
No. 2 heavy melting steel...	6.50 to 7.00
No. 1 railroad wrought...	9.50 to 10.00
Bundled sheets...	6.00
Hydraulic compressed, new...	7.00 to 7.50
Hydraulic compressed, old...	6.00 to 6.50
Machine shop turnings...	5.50
Heavy axle turnings...	7.00 to 8.00
Cast borings (nom.)...	3.50
Heavy breakable cast...	9.50
Stove plate (steel works)...	7.50
No. 1 low phos. hvy...	11.00 to 12.00
Couplers and knuckles...	11.00
Roller steel wheels...	10.00 to 10.50
No. 1 blast furnace...	3.50
Spec. iron and steel pipe...	10.50
Shafting...	15.00 to 15.50
Steel axles...	15.00 to 15.50
No. 1 forge fire...	7.50 to 8.00
Cast iron car wheels...	11.50 to 12.00
No. 1 cast...	10.50
Cast borings (chem.)...	11.50 to 12.00
Steel rails for rolling...	10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel...	\$7.50 to \$8.00
No. 2 heavy melting steel...	6.75 to 7.25
Compressed sheet steel...	7.00 to 7.25
Light bundled sheet stampings...	6.00 to 6.50
Drop forge flashings...	6.00 to 6.25
Machine-shop turnings...	4.75 to 5.25
Short shoveling turnings...	5.75 to 6.25
No. 1 busheling...	6.50 to 6.75
Steel axle turnings...	7.50 to 8.00
Low phos. billet crops...	14.00 to 14.50
Cast iron borings...	5.25 to 5.75
Mixed borings and short turnings...	5.25 to 5.75
No. 2 busheling...	5.25 to 5.75
No. 1 cast...	9.00 to 9.50
Railroad grate bars...	6.00 to 6.50
Stove plate...	6.00 to 6.50
Rails under 3 ft....	15.00 to 15.50
Rails for rolling...	13.00 to 13.50
Railroad malleable...	11.00 to 11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel...	\$9.00
No. 2 heavy melting steel...	8.00
Scrap rails...	9.50 to 10.00
New hydraulic comp. sheets...	7.50
Old hydraulic comp. sheets...	6.00 to 6.50
Drop forge flashings...	7.50
No. 1 busheling...	7.50 to 8.00
Hvy. steel axle turnings...	8.00 to 8.50
Machine shop turnings...	4.50 to 5.00
Knuckles and couplers...	10.00
Coil and leaf springs...	10.00
Roller steel wheels...	10.00
Low phos. billet crops...	12.50 to 13.00
Short shov. steel turnings...	7.00 to 7.50
Short mixed borings and turnings...	6.00 to 6.50
Cast iron borings...	6.00 to 6.50
No. 2 busheling...	4.50 to 5.00
Steel car axles...	12.00
Iron axles...	16.00 to 16.50
No. 1 machinery cast...	10.00 to 10.50
Stove plate...	8.25 to 8.50
Steel rails, 3 ft. and under...	12.00 to 12.50
Cast iron car wheels...	10.50 to 11.00
Industrial malleable...	10.00 to 10.50
Railroad malleable...	10.00 to 10.50
Chemical borings...	9.00 to 9.50

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel...	\$8.50 to \$9.00
Scrap steel rails...	8.00 to 8.50
Short shoveling turnings...	4.00 to 5.00
Stove plate...	6.00
Steel axles...	14.00
Iron axles...	14.00
No. 1 railroad wrought...	6.50
Rails for rolling...	10.00
No. 1 cast...	9.00
Tramcar wheels...	10.00 to 10.25
Cast iron borings, chem...	12.00 to 12.50

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel...	\$7.50 to \$8.00
No. 1 heavy melting...	6.75 to 7.25
No. 2 heavy melting...	6.50 to 7.00
No. 1 locomotive tires...	8.00 to 8.50
Misc. stand-sec. rails...	8.25 to 8.75
Railroad springs...	8.50 to 9.00
Bundled sheets...	4.25 to 4.75
No. 2 railroad wrought...	7.00 to 7.50
No. 1 busheling...	6.00 to 6.50
Cast iron borings and shoveling turnings...	4.75 to 5.25
Iron rails...	7.00 to 8.00
Rails for rolling...	9.50 to 10.00
Machine shop turnings...	3.00 to 3.50
Heavy turnings...	5.50 to 6.00
Steel car axles...	10.50 to 11.00
Iron car axles...	14.00 to 14.50
Wrot iron bars and trans.	5.50 to 6.00
No. 1 railroad wrought...	5.00 to 5.50
Steel rails, less than 3 ft....	10.00 to 10.50
Steel angle bars...	7.00 to 7.50
Cast iron car wheels...	6.50 to 7.00
No. 1 machinery cast...	8.00 to 8.50
Railroad malleable...	5.50 to 6.00
No. 1 railroad cast...	6.25 to 6.75
Stove plate...	6.50 to 7.00
Relay. rails, 60 lb. and under...	16.00 to 16.50
Relay. rails, 70 lb. and over...	20.00 to 21.00
Agricult. malleable...	5.00 to 5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel...	\$4.50 to \$5.50
Heavy melting steel (yard)...	2.75 to 3.00
No. 1 hvy. breakable cast...	5.50 to 6.00
Stove plate (steel works)...	3.50
Machine shop turnings...	2.00
Short shoveling turnings...	2.00
Cast borings...	2.50
No. 1 blast furnace...	2.50
Steel car axles...	11.00 to 11.50
Iron car axles (nom.)...	14.00 to 14.50
Spec. iron and steel pipe...	5.50
Forge fire...	3.25 to 3.75
No. 1 railroad wrought...	5.00 to 5.25
No. 1 yard wrought, long...	4.00 to 4.25
Rails for rolling...	6.00 to 6.25
Stove plate (foundry)...	4.75 to 5.50
Malleable cast (railroad)...	6.00 to 6.50
Cast borings (chemical)...	8.00 to 8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast...	\$8.50
No. 1 hvy. cast (cupola size)...	6.50
No. 2 cast...	5.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel...	\$3.80 to \$4.60
Scrap T rails...	4.10 to 4.60
Scrap girder rails...	3.10 to 3.60
No. 1 railroad wrought...	4.50 to 5.00
Machine shop turnings...	1.25 to 2.10
Cast iron borings...	1.50 to 1.75
Bundled skeleton, long...	3.00 to 3.25
Forge flashings...	3.00 to 3.50
Blast furnace scrap...	1.25 to 1.30
Forged scrap...	2.00 to 2.50
Shafting...	10.00 to 10.50
Steel car axles...	11.00 to 12.00
Wrought pipe...	4.00 to 4.25
Rails for rolling...	8.50 to 9.00
Cast iron borings, chemical...	7.00 to 7.25
No. 2 cast...	4.85 to 5.00

Per gross ton delivered consumers' yards:

Textile cast...	8.75 to 9.25
No. 1 machinery cast...	8.75 to 9.25
Stove plate...	5.00 to 5.25
Railroad malleable...	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel...	\$6.75 to \$7.25
Scrap rails for melting...	8.50 to 9.00
Loose sheet clippings...	3.50 to 4.00
Bundled sheets...	5.50 to 6.00
Cast iron borings...	3.25 to 3.75
Machine shop turnings...	4.00 to 4.50
No. 1 busheling...	5.00 to 5.50
No. 2 busheling...	3.25 to 3.75
Rails for rolling...	9.00 to 9.50
No. 1 locomotive tires...	8.50 to 9.00
No. 2 railroad wrought...	6.75 to 7.25
Short rails...	11.75 to 12.25
Cast iron car wheels...	8.25 to 8.75
No. 1 machinery cast...	10.00 to 10.50
No. 1 railroad cast...	8.75 to 9.25
Burnt cast...	4.25 to 4.75
Stove plate...	4.25 to 4.75
Brake shoes...	4.25 to 4.75
Agricultural malleable...	8.00 to 8.50
Railroad malleable...	9.00 to 9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting...	\$6.00 to \$6.50
Borings and short turnings...	4.50 to 5.00
Long turnings...	4.00 to 4.50
No. 1 machinery cast...	8.50 to 9.00
Automotive cast...	11.00 to 11.50
Hydraulic comp. sheets...	5.75 to 6.25
Stove plate...	5.00 to 5.50
New No. 1 busheling...	5.00 to 5.50
Old No. 2 busheling...	3.25 to 3.75
Sheet clippings...	3.50 to 4.00
Flashings...	5.25 to 5.75

CANADA

Dealers buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel...	\$7.00	\$6.00
Rails, scrap...	7.00	6.00
No. 1 wrought...	6.00	6.00
Machine shop turnings...	2.00	2.00
Roller plate...	5.00	4.50
Heavy axle turnings...	2.50	2.50
Cast borings...	2.00	2.00
Steel borings...	2.00	2.00
Wrought pipe...	2.00	2.00
Steel axles...	7.00	9.00
Axles, wrought iron...	7.00	11.00
No. 1 machinery cast...	10.00	10.00
Stove plate...	8.00	8.00
Standard carwheels...	8.50	8.50
Malleable...	8.00	8.00

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.50c. to 1.80c.
Rail steel reinforcement—	
For buildings.....	1.30c. to 1.40c.
Highway slabs.....	1.40c.
For bridges and culverts.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Plats and squares.....	3.60c.
Bands, $\frac{7}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ($\frac{3}{4}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
	Per Cent Off List
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq. tap, or blank.....	73
Hot-pressed nuts, hex. tap, or blank.....	73
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforce. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{3}{8}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Hot-rolled sheets (No. 10).....	3.00c.
No. 9 ann'd wire, per 100 lb.....	\$2.25
No. 9 galv. wire, per 100 lb.....	2.70
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes.....	2.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforce. bars.....	3.00c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	2.90c.
Bands.....	3.20c.
Squares.....	4.00c.
Cold-fin. rounds and hex.....	2.50c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot-rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (10 to 45 kegs).....	2.65
Larger quantities.....	2.50
Cement c'd nails, base 100-lb. keg.....	2.95
Chain, per 100 lb.....	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in., 4-in.....	\$17.50
Lap-welded steel boiler tubes, 2-in., 4-in.....	36.00
	16.50
	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24).....	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands.....	3.35c.
Hoops.....	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars.....	3.21c.
Iron bars, Swed. charcoal.....	7.00c. to 7.55c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'd sheets (No. 24*).....	3.60c.
Galvanized sheets (No. 24*).....	4.00c.
Long term sheets (No. 24).....	5.00c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger.....	3.40c.
Smooth finish, 1 to 2 $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller.....	65 to 65 and 10
1 x 20 in. and smaller.....	65 to 65 and 10
Carriage bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller.....	65 to 65 and 10
$\frac{3}{4}$ x 20 in. and smaller.....	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

ST. LOUIS

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.40c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.00c.

	Per Cent Off List
Tank rivets, $\frac{5}{16}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

PACIFIC COAST

	(Less than 5000 Lb.)	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier.....	2.80c.	3.00c.	2.50c.	
Soft steel bars.....	2.80c.	3.00c.	2.50c.	
Reinforcing bars.....	2.80c.	2.80c.	3.00c.	
Hot-rolled annealed sheets (No. 24).....	3.90c.	4.00c.	4.00c.	
Hot-rolled sheets (No. 10).....	3.40c.	3.50c.	3.50c.	
Galv. sheets (No. 24).....	4.10c.	4.20c.	4.50c.	
Struc. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.....	5.00c.	5.00c.	5.50c.	
Special nails: common 4 to 60d., smooth box 4 to 20d.; finish 6 and 8 d.; base per keg.....	\$2.55	\$2.45	\$2.40	
Other wire nails, base per keg.....	2.80	2.70	2.65	
Cement c'd nails, 100-lb. keg.....	2.65	2.70	2.65	

PITTSBURGH

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.80c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles.....	3.65c.
Hot-rolled sheets (No. 10).....	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large.....	2.50c.
Small.....	2.75c. to 2.90c.
Boat.....	3.00c.
Track bolts, all sizes, per 100 count, 73 and 10 per cent off list.....	
Machine bolts, 100 count, 73 and 10 per cent off list.....	
Carriage bolts, 100 count, 73 and 10 per cent off list.....	
Nuts, all styles, 100 count, 73 and 10 per cent off list.....	
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'd, base per 100 lb.....	2.30
Wire, galv. soft, base per 100 lb.....	2.75
Common wire nails, per keg.....	\$2.05 to 2.15
Cement coated nails, per keg.....	2.05 to 2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.50c.
Structural shapes.....	2.50c.
Soft steel bars, small shapes, iron bars (except bands).....	2.60c.
Reinforce. steel bars, sq. twisted and deform.....	2.30c.
Cold-fin. steel, rounds and hex.....	3.40c.
Cold-fin. steel, sq. and flats.....	3.90c.
Steel hoops.....	3.15c.
Steel bands, No. 12 to $\frac{3}{8}$ -in., inclu. Spring steel.....	5.00c.
Hot-rolled box annealed sheets (No. 24).....	3.55c.
Galvanized sheets (No. 24).....	4.60c.
Hot-rolled blue annealed sheets (No. 10).....	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ -in.....	5.20c.
Swedish iron bars.....	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates.....	*3.35c.
Structural shapes—	
Angles and beams.....	*3.35c.
Tees.....	*3.35c.
Zees.....	*3.35c.
Soft steel bars, small shapes.....	*3.25c.
Reinforcing bars.....	3.10c. to 3.25c.
Iron bars—	
Refined.....	3.25c.
Best refined.....	4.60c.
Norway rounds.....	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	*3.75c. to 4.25c.
Hoop steel.....	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
	Per Cent Off List*
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts.....	40 and 10
Cold-punched nuts.....	40 and 10
Stove bolts.....	70 and 10

*Base price (250 to 999 lb.): less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Fabricated Structural Steel

FABRICATED structural steel projects of 32,500 tons compare with about 32,000 tons a week ago. Included are 3500 tons each for a jail and a Department of Health building in New York, 1200 tons for a State armory at Jamaica, N. Y., 3000 tons for three bridges at Joliet, Ill., and 4300 tons for a viaduct in Chicago.

Awards of 12,500 tons compare with 17,000 tons a week ago and 20,000 tons two weeks ago. Included are 2000 tons for a bridge over the Illinois River at Peoria, and 1080 tons for a bridge on Michigan Avenue in Buffalo. Awards follow:

NORTH ATLANTIC STATES

Springfield, Mass., 300 tons, Boston & Albany Railroad bridge repairs, to New England Structural Co.
 Everett, Mass., 178 tons, Merrimack Chemical Co. acid building, to New England Structural Co.
 Danby, Vt., 125 tons, crane runway, to an unnamed fabricator.
 Rensselaer, N. Y., 110 tons, factory, to Lackawanna Steel Construction Co.
 Long Island City, 100 tons, Queens General Hospital, to Douglas Iron Works.
 Brooklyn, 440 tons, plant for Jersey Meadow Gold Ice Cream Co.
 New York, 835 tons, bridge for Long Island Railroad at Linden Boulevard, East New York, to McClintic-Marshall Corp.
 New York, 400 tons, pier No. 9, to Belmont Iron Works.
 New York, 280 tons, alterations to Presbyterian Hospital, to Taylor-Fichter Steel Construction Co., New York.
 Penn Yan, N. Y., 170 tons, 70 poles, to Weyerhaeuser Co., St. Paul, Minn.
 Buffalo, 1080 tons, Michigan Avenue bridge, to Wisconsin Bridge & Iron Works.
 Camden, N. J., 110 tons, Pennsylvania Railroad bridge, to Ingalls Iron Works.
 Camden, 170 tons, Pennsylvania Railroad bridges, to Bethlehem Fabricators, Inc.
 St. Nicholas, Pa., 270 tons, additional buildings at colliery of Philadelphia & Reading Coal & Iron Co., to Belmont Iron Works.

THE SOUTH

Jacksonville, Fla., 600 tons, post office, to American Bridge Co.
 Elvalde, Tex., 375 tons, bridge, to Petroleum Iron Works.
 Baton Rouge, La., 1072 tons, two bridges over Tangipahoa and Bogachito rivers, to Jones & Laughlin Steel Corp.

CENTRAL STATES

Cleveland, 1800 tons, sheet steel piling for sewage disposal plant, to Bethlehem Steel Co. and Inland Steel Co.
 Melrose Park, Ill., 425 tons, viaduct for Indiana Harbor Belt Railroad, to American Bridge Co.
 State of Illinois, 200 tons, Jefferson County bridges, to Vincennes Bridge Co.
 Oak Park, Ill., 400 tons, arcade building, to an unnamed bidder.
 Peoria, Ill., 2000 tons, steel superstructure for bridge across Illinois River, to Wisconsin Bridge Co.
 Madison County, Ill., 154 tons, highway bridge, to Missouri Bridge & Iron Co.
 Chicago, Ill., 160 tons, American Airways hangar, to Austin Co.
 Kansas City, Mo., 150 tons, N. A. T. hangar at municipal airport, to Austin Co.
 State of Iowa, 235 tons, highway bridges, to Pittsburgh-Des Moines Steel Co.
 Cloquet, Minn., 300 tons, industrial plant, to an unnamed bidder.

WESTERN STATES

Wenatchee, Wash., 700 tons, highway bridge, to Pacific Car & Foundry Co.
 Needles, Cal., 140 tons, machine shop for Santa Fe road, to Kansas City Structural Steel Co.
 San Benito County, Cal., 200 tons, two State highway bridges, to Dyer Brothers.

CANADA

Edmonton, Alta., 275 tons, bridge over Rat Creek, to Dominion Bridge Co.

STRUCTURAL PROJECTS PENDING

NORTH ATLANTIC STATES

Providence, R. I., 375 tons, theater.

Waverly, Mass., 148 tons, State institute unit.
 Wrentham, Mass., 130 tons, State institute unit.
 Tewksbury, Mass., 105 tons, State institute units.
 New York, 3500 tons, jail in Bronx.
 New York, 3500 tons, department of health building.
 Jamaica, N. Y., 1200 tons, armory.
 Cold Spring, N. Y., 800 tons, Hudson River Stone Co. crushing plant.
 Pelham, N. Y., 210 tons, overcrossing, Westchester County Park Commission.
 Albany-Rensselaer, N. Y., 7500 tons, bridge; Booth & Flynn Co., low bidder for general contract.
 Attica, N. Y., 1000 tons, State prison.
 New York, 300 tons, Brooklyn State Hospital in Queens Borough.
 Brooklyn, 390 tons, pier shed at foot of Cranberry Street.
 Poughkeepsie, N. Y., 700 tons, building for Hudson River State Hospital.
 State of New York, 435 tons, highway bridge.
 State of Maryland, 500 tons, highway bridges; bids taken Nov. 17.
 Fort Millin, Del., 3000 tons of sheet piling, channel maintenance at Pea Patch Island; alternate bids on wood piling.
 Selbyville, Del., 150 tons, grade and high school.
 Montgomery County, Pa., unstated tonnage, bridge on Valley Road over Pennypack Creek.

CENTRAL STATES

Detroit, 500 tons, furnace work, for Ford Motor Co.
 State of Ohio, 208 tons, highway bridge in Ottawa County; bids taken.
 Chicago, 2600 tons, Woodrow Wilson High School.
 State of Illinois, 1200 tons, highway bridge work; Clinton Bridge Work, low bidder.
 Hoopeston, Ill., 500 tons, factory for Sprague-Sells Corp.
 Logan County, Ill., 102 tons, highway bridge, Watt Construction Co., Winchester, Ill., general contractor.
 Evanston, Ill., 1500 tons, water storage tank.
 Joliet, Ill., 3000 tons, three bascule bridges over canal.
 State of Illinois, 1200 tons, highway bridges; bids to be asked about Dec. 1.
 Chicago, 4300 tons, viaduct, Wisconsin Bridge & Iron Co. low bidder.
 St. Louis, 2000 tons, North American Building.

THE SOUTH

Fort Worth, Tex., 300 tons, train sheds for Atchison, Topeka & Santa Fe Railroad.
 Greensboro, N. C., 100 tons, post office; George H. Rommel & Co., Louisville, Ky., low for general contract.

WESTERN STATES

Portland, Ore., 1800 tons, post office.
 San Francisco, 325 tons, sheet steel piling for construction of Third Street bridge.
 Toronto, 1000 tons, building for Toronto Hydroelectric System, 225 Yonge Street.

CANADA

Toronto, 1000 tons, building for Toronto Hydroelectric System, 225 Yonge Street.

FABRICATED PLATE

AWARDS

Cleveland, 300 tons, tanks for General Electric Co., to Blaw-Knox Co.
 Ashland, Ohio, 250 tons, water storage tank, to Youngstown Boiler & Tank Co.

San Francisco, 782 tons, Bear Creek or Red Mountain bar siphon for mountain water system, to Berkeley Steel Construction Co.
 Port Angeles, Wash., 100 tons, digester for Olympic Fruit Products Co., to Commercial Boiler Works.

PENDING PROJECTS

Long Beach, Cal., 1800 tons, six reservoir tanks, Western Pipe & Steel low bidder.

Reinforcing Steel

Albany, N. Y., 2000 tons rail steel, State grain elevator; from James Stewart & Co., Chicago, general contractor, to Franklin Steel Co., Sweet's Steel Co., and Buffalo Steel Co.
 Bedford, Ohio, 925 tons, grade separation bridge for Ohio Department of Highways, to Buffalo Steel Co.
 Chicago, 280 tons, two public schools, to Inland Steel Co.
 Cleveland, 2000 tons, municipal garage, to Patterson Leitch Co., Corrigan McKinney Steel Co. furnished steel.
 Peoria, Ill., 145 tons, superstructure for bridge across Illinois River, to Wisconsin Bridge & Iron Co.
 Sacramento, Cal., 125 tons, State printing office, to Gunn, Carle & Co.
 Washington, 310 tons, two new buildings and an addition to St. Elizabeth's Hospital; bids for general contract taken.
 Chillicothe, Ohio, 350 tons, Veterans' Hospital; H. G. Christman & Son, South Bend, Ind., low bidder for general contract.
 Columbia, S. C., 350 tons, Veterans' Hospital; W. F. Barstow Co., Reading, Pa., low bidder for general contract.
 State of Ohio, 265 tons, several highway bridges.
 State of Illinois, 1000 tons, highway bridges.
 Chicago, 800 tons, Woodrow Wilson school.
 Chicago, 400 tons, heating plant for Union Station.
 State of Illinois, 1300 tons, road work; general contracts awarded.
 St. Louis, 400 tons, North American Building.
 St. Louis, 100 tons, Rock Creek public sewer for Board of Public Service.
 Bakersfield, Cal., 100 tons, Kress store.
 Orange County, Cal., 292 tons, Laguna Beach State highway.
 Los Angeles, 100 tons, Marion Davies Foundation Clinic building.
 Pasadena, Cal., 250 tons, science building at California Institute of Technology.
 State of New Jersey, 250 tons, roadwork, Whippany to route 5, to Truscon Steel Co., Youngstown, Ohio.
 Newark, N. J., 225 tons, city garage, to Igou Brothers, Newark.
 Hackensack, N. J., 100 tons, Bergen County administration building, to Concrete Steel Co.
 Cleveland, 4700 tons, sewage disposal plant, to concrete Steel Co.; steel to be made by Republic Steel Corp.

REINFORCING BARS PENDING

Inquiries for reinforcing steel bars include the following:

Revere, Mass., 150 tons, shore protection.
 Irving-Gill, Mass., 150 tons, State bridge.
 Boston, 100 tons, Morton Street bridge.
 State of Massachusetts, 150 tons, three State bridges.
 Creedmore, N. Y., 160 tons, Brooklyn State Hospital buildings; bids opened Nov. 14.
 Hempstead, N. Y., 695 tons, Meadowbrook Hospital.
 Peekskill, N. Y., 150 tons, city reservoir; bids opened Nov. 23.
 Poughkeepsie, N. Y., unstated tonnage, Hudson River State Hospital.
 New York, 500 tons, Forty ninth Street sewer project.
 New York, 243 tons, Pier 6; bids rejected, new bids out Nov. 20.
 Newark, N. J., 350 tons, city railway.
 Erie Railroad, 100 tons, overcrossing at West Arlington, N. J.
 Greensboro, N. C., 175 tons, post office; George H. Rommel & Co., Louisville, Ky., low for general contract.

Propose Basing Prices of Scrap on Steel Bars

Plans for stabilizing the scrap iron business in California will be discussed at the Nov. 19 meeting of the Pacific Coast chapter, Institute of Scrap Iron & Steel, to be held in Los Angeles. The plans include a proposed arrangement with steel mills to stabilize scrap prices on the basis of the price of steel bars and a cooperative arrangement among scrap iron dealers to establish a central yard for storing surplus scrap which the established yards are unable to carry.

Dutch Pig Iron Agent Names Representatives

William H. Muller & Co., 122 East Forty-second Street, New York, recently appointed sales agents for Royal Dutch iron in the eastern United States, have named the following district agencies: For Pennsylvania, Delaware, Maryland and southern New Jersey, Carson, Marshall & Co., Franklin Trust Building, Philadelphia; northern New Jersey and Connecticut, Phillips Isham, 30 Church Street, New York; Rhode Island and Massachusetts, William J. Breen, 192 Parkway, Winchester, Mass. The metropolitan New York territory will be represented by William H. Muller & Co.

German Invention Drives Motor Car on Crude Oil

BERLIN, GERMANY, Nov. 2.—A Ford motor car has completed a round trip from here to Cologne, a distance of about 650 miles, driven by gas obtained from crude oil through a small converter attached to the motor. This generator of gas from crude oil is the development of a south German company, which claims that it can be manufactured for about 100 m. (\$23.90) and will reduce the cost of operating an automobile 50 to 60 per cent.

Bureau of Mines Research on Manganese

WASHINGTON, Nov. 17.—To make available the results of its comprehensive investigations of manganese, the metallurgical division of the Bureau of Mines plans to publish within the next year an exhaustive monograph on manganese. The experimental work of the division, the report discloses, during 1932 will be directed to a thorough study of the effect on smelting methods and steel practice and the products obtained therefrom of the beneficiation of iron ore to an exceptionally high degree.

The report says that the program for the production of ferromanganese

from the manganiferous iron ore of Minnesota has just been completed. From an ore containing 8 per cent of manganese a manganiferous pig iron was made, it is pointed out.

Opens Hearth Research of Bureau of Mines

WASHINGTON, Nov. 17.—The fiscal year 1930-31 has marked the completion of the five-year program of research on the physical chemistry of steel making conducted at the Pittsburgh Experiment Station in cooperation with the Carnegie Institute of Technology and the steel industry as represented by a metallurgical advisory board.

This study, Director Turner Scott of the Bureau of Mines says in his annual report, has resulted in important additions to the knowledge of the mechanics of open-hearth reactions, particularly with regard to deoxidation, and he declares that the contact brought about by this work between the steel makers and the research engineers of the bureau has been of great value to both.

Outlining results obtained from the research, Director Scott says:

As a tangible result of this work, a new alloy for the deoxidation of steel has been developed. This alloy contains manganese, silicon, and iron, and is well adapted to manufacture from domestic manganese ores. Its development is therefore a contribution toward the solution of the domestic manganese problem, as well as the problem of increased freedom of steel from inclusion. This alloy has been used by steel plants under the supervision of bureau engineers, and its advantages have been made sufficiently evident to the industry so that further application will be made directly by industrial organizations.

British Output of Iron and Steel Increases

LONDON, Nov. 11 (By Cable).—Output of pig iron in Great Britain in October was 284,200 gross tons, with steel ingots and castings at 457,400 tons. Pig iron was at the highest rate since July and steel at the highest since March.

Production for the first 10 months of 1931, with comparisons of monthly averages of recent years, and of 1913, are shown below:

	Pig Iron	Steel
1913	855,000	638,600
1928	550,800	710,000
1929	632,400	804,600
1930	516,400	608,200
1931—January	237,200	402,200
February	318,200	486,400
March	357,100	500,100
April	323,200	397,400
May	346,500	435,100
June	323,800	428,900
July	317,000	428,700
August	275,700	375,300
September	248,200	400,500
October	284,200	457,400

Wholesale Prices Move Still Lower

Commodity prices reported by the United States Bureau of Labor Statistics dropped to 68.4 in October, against 69.1 in September. This index of 550 commodities is based on 100 as the average in 1926. The downward movement, which began in August, 1929, has been continuous except for a slight interruption last summer.

Metal prices—one of the 10 major groups—declined to 86.5 from 87.2 in September. This was caused by a fractional drop in iron and steel and severe drops in non-ferrous metals and agricultural implements, while automobiles and "other" metal products were unchanged.

All but two of the 10 groups declined. Fuels and lighting materials recorded a fractional advance, as did the miscellaneous group.

Flat Rolled Steel Looms Large in Our Exports

WASHINGTON, Nov. 17.—Flat rolled iron and steel products made up about one-quarter of all iron and steel exports from the United States in 1930, and the proportion has been even larger in the first nine months of this year. This classification includes galvanized and black sheets, cold-rolled strip steel, hoops, bands and scrolls and tin plate. Exports of these products in 1930 totaled 498,190 tons, and in the first nine months of this year 208,374 tons. The largest markets are in North and Central America and the West Indies, with the Far East second, South American countries third, Europe fourth, and Africa fifth.

Pipe Lines

Ohio Fuel Gas Co., operated by Columbia Gas & Electric Corp., Charleston, W. Va., and 61 Broadway, New York, will build pipe line in northern part of Marion County, Ind., to link Ohio and Texas gas field supply.

Lycoming Gas Corp., Wayne, N. Y., let contract to Rich & Co., Bradford, Pa., for 10-in. pipe line from Wayne fields to Penn Yan, N. Y., and vicinity, about 15 miles, for natural gas. Company also plans 20-in. pipe line from Tioga, Pa., gas field to Syracuse, N. Y., and vicinity, about 100 miles. Company is a subsidiary of Standard Oil Co. of New Jersey.

Western Service Co. of Oklahoma, Braniff Building, Oklahoma City, plans installation of natural gas pipe line from Oklahoma gas fields to Guthrie, Okla., and vicinity, and line to McCloud, Okla. Cost over \$500,000.

Walsh Holyoke Steam Boiler Works, Holyoke, Mass., will fabricate 3600 ft. of 36 in. pipe for Waltham, Mass.

Railroad Equipment

Lehigh Valley Railroad has placed orders for 20 high-speed freight locomotives, divided equally between American Locomotive Co. and Baldwin Locomotive Works.

Reading Co. is in the market for 30 multiple-unit motor passenger cars and 20 multiple-unit trailer cars.

Southern State Railways of Persia have ordered 50 ballast cars from Magor Car Corp.

British Expect Emergency Tariff Act; Dutch Seek Increased Export Trade

(By Cable)

LONDON, ENGLAND, Nov. 16.

BRITISH industry is anxiously awaiting the expected Government announcement of an emergency act stopping excessive imports. Meanwhile, iron and steel prices are firm but business is quiet.

Domestic consumers are absorbing the bulk of present pig iron and semi-finished steel output, and there is some possibility that additional blast furnaces will be started.

Sales of Continental steel here are considerably curtailed by the prospect of a temporary tariff. General business conditions in Continental markets are decidedly unsatisfactory, and despite moderate steel buying from the Far East, mills are greatly in need of tonnage.

Certain European mills are further curtailing operations, and the Vereinigte Stahlwerke Friedrichshütte, Herdorf, will suspend operation of its blast furnaces at the end of this month. The Koenigslaurahütte has closed half its plant, dismissing 8000 employees, a move necessitated by financial difficulties.

Two mills in Upper Silesia, which have been rolling steel orders for the Soviet, have suspended all deliveries on contracts, as the terms were based on the pound sterling and the works were incurring heavy losses at the present exchange rates.

The Soviet Union is planning to erect a new steel works at Leningrad to cost about 51,000,000 rubles. Output of the Russian Stalye Trust in October was 343,000 tons of pig iron and 261,000 tons of raw steel.

The Government of the Netherlands is considering an investigation of foreign trade conditions to determine if an increase in Dutch iron and steel exports is possible.

Demand for Welsh tin plate is moderate and prices are steadier. Mills willing to sell at low prices are not so much in evidence and some good inquiry is being received from overseas markets, including Australia and the Far East, suggesting that consumers are no longer inclined to delay covering requirements. Welsh tin plate mills are not apprehensive of a tariff on sheet bars, as they are using Welsh material at present and their prices are the lowest in the world.

United Kingdom exports in October were 159,000 tons of iron and steel. Pig iron exports contributed 13,800 tons to the total, of which the United States was sent 350 tons.

selling the alloy into Germany at low prices. In one instance the British product has been bought at £52 10s. a ton, c.i.f., or, at the current exchange rate, about \$200 a ton, 40 per cent under the German price. A market agreement is being sought with these sellers.

Aluminum Producers Form New Company

HAMBURG, GERMANY, Nov. 4.—The Alliance Aluminium Compagnie A. G., recently formed at Basel, Switzerland, includes all European producers and the Canadian interest. Andre Henri Couannier of the Aluminum Co., Ltd., Toronto, is a member of the board of directors of the newly formed company.

Soviet Places Orders in Germany and Saar

HAMBURG, GERMANY, Nov. 4.—Orders for coal mining and steel rolling machinery totaling about \$1,800,000 have been placed by the Soviet Union in Germany on credit terms requiring payments in three, six and twelve months. About \$5,500,000 of iron and steel products have been placed with Saar mills, the Government guaranteeing 70 per cent of the credits.

Last Silesian Furnace Blown Out

BERLIN, GERMANY, Nov. 2.—The Julienhütte stack of the Vereinigte Oberschlesische Hüttenwerke, the last furnace in blast in German Silesia, has been blown out. This is said to be the first time in 250 years that no pig iron has been made in this district.

British Stainless Steel Exported at Low Prices

HAMBURG, GERMANY, Nov. 4.—Despite a market protection agreement between the German producer of stainless steel, the Friedrich Krupp A. G., and the leading British makers, John Brown & Co. and Thomas Firth & Sons, independent British mills are

Hungarian Steel Works May Have American Aid

BERLIN, GERMANY, Nov. 2.—Confirmation has been obtained from the Hungarian Government of reports that American steel companies are negotiating with the Royal Hungarian Iron & Steel Co. to provide it with financial and technical aid.

British and Continental European Export Prices f.o.b. United Kingdom and Continental Ports

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton, £ at \$3.96

Ferromanganese, export.	£9 0s.		\$35.64
Billets, open-hearth....	5 7½	to 5 12½s.	21.23 to 22.19
Black sheets, Japanese			
specifications	9 15	to 10 0	38.61 to 39.60
Tin plate, per base box..	0 14	to 0 14½	2.77 to 2.82
			Cents a Lb.
Steel bars, open-hearth..	7 17½	to 8 7½	1.39 to 1.48
Beams, open-hearth....	7 7½	to 7 17½	1.30 to 1.39
Channels, open-hearth..	7 12½	to 8 2½	1.34 to 1.43
Angles, open-hearth....	7 7½	to 7 17½	1.30 to 1.39
Black sheets, No. 24 gage	8 5	to 8 10	1.46 to 1.59
Galvanized sheets, No. 24			
gage	9 2½	to 9 5	1.61 to 1.63

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86

Billets, Thomas	£2 15s.	to £2 16s.	\$13.36 to \$13.61
Wire rods, No. 5 B.W.G.	5 5		25.51
Black sheets, No. 31			
gage, Japanese.....	11 5		54.68
			Cents a Lb.
Steel bars, merchant....	3 0	to 3 1	0.66 to 0.67
Beams, Thomas	3 1	to 3 1½	0.66 to 0.67
Angles, Thomas, 4-in.			
and larger	3 1	to 3 1½	0.66 to 0.67
Hoops and strip steel			
over 6-in. base.....	3 17½		0.86
Wire, plain, No. 8.....	5 9	to 5 1½	1.09 to 1.10
Wire, barbed, 4-pt., No.			
10, B.W.G.	8 10		1.87

BOOK REVIEWS

(Concluded from page 1301)

Why Recognize Russia? by Louis Fischer. 293 pages, published by Jonathan Cape & Harrison Smith, New York, 1931. Price \$2.

Arguing that "the absence of relations between the two greatest countries in the world cannot endure to eternity," the author makes a plea for Governmental recognition of Russia, in accordance with the action of 24 listed countries, as a means of strengthening world conditions. Wheat, disarmament and other points wherein the two countries come into contact, not to mention the large and thriving trade now existing between them, are brought up as reasons for this proposed recognition.

The book is made up largely of quotations from different statesmen and authorities on international affairs and from newspaper editorials, together with the citation of a large number of facts regarding international trade and contacts, all woven together to make up an argument for diplomatic intercourse between the United States and Russia.

The author argues that more American goods could be sold to Russia if its *de facto* government were recognized. He carefully side-steps the steadfastly maintained attitude of the United States, to the effect that recognition will not be accorded to another Government that announces, as a principal objective, its hope to secure the overthrow of the form of government we have in the United States.

Quite a bit of space is allotted to discussion of the bitter controversies and "off-again, on-again" relations between the Russian Government and that of Great Britain, occasioned by the extra-diplomatic activities by those accredited by Russia to Great Britain in a diplomatic or quasi-diplomatic capacity. Somehow the idea persists in the minds of many of us that, where the representation of a foreign Government gives rise to this sort of quarreling and bickering, there should be more cogent reasons for recognition than any which have come to our notice.

S. G. K.

Corrosion from Flue Gases

BULLETIN No. 228 of the Engineering Experiment Station, University of Illinois, reports an investigation of the corrosion of power plant equipment by flue gases. The bulletin is of 122 pages, with 21 illustrations, mostly photographic, and with a large amount of data obtained in the study, which was made in conjunction with the Utilities Research Commission of Chicago.

This program has acquired added importance with the use of higher operating steam pressures, giving greater prevalence of leaks. Investigation so far has been all of a technical nature. No attempt has yet been made to try out new features of operation under plant conditions. Results are reported of tests made on various corrosion-resisting alloys, and on protective coatings under conditions existing in exposure to flue gases.

Directory of Steel Casting Makers

A directory of the manufacturers of steel castings and also of makers of heat and corrosion resistant alloy castings, in both the United States and Canada, has been published by the Steel Founders' Society of America, Inc., 932 Graybar Building, New York. It contains an alphabetical list of the companies and also a geographical list, with information of the kinds and sizes of castings made

and a rather full listing of the personnel of the companies.

A considerable array of statistics features the volume, which is one of 210 pages, selling for \$10 a copy. Tabulations, besides capacities of individual plants together with data as to the kinds, uses and sizes of castings obtainable, includes the compilations for the industry as a whole. Makers outside of the association as well as those in it are covered. Trade practice customs, hints to users of castings and an enumeration of a five-year program of the society form a part of the non-directory portion of the book.

Reinforcing Wire Fabric for Pavements

A pamphlet of 39 pages, issued by the Wire Reinforcement Institute, Washington, and illustrated, deals with the use of various forms of welded wire fabric as reinforcement in concrete pavements. Properties of the welded wire fabric are gone into in some detail, and instructions are given, under general specifications, for making use of this material. Many of the illustrations show operations in progress and thus aid in an understanding of the subject.

Use of reinforcement distributed through the entire pavement, and most economically utilized in fabricated sheet form, is said, in the pamphlet, to be the only effective means of maintaining the integrity of individual slab units.

A vivid picture of iron mining in the Adirondacks in New York State, the mining of iron stone by underground workings, with drilling, blasting, hoisting, amid darkness, muck and water, is given by William Heyliger in what is described as a story for men and boys. It may be there is too much nerve-wracking action to have a feminine appeal, for the story runs at a breakneck pace and the reader finds himself absorbed trying to keep abreast of the telling. The title is Johnny Bree, who has the makings of a youthful gangster, but finds himself amid the surroundings of his almost forgotten early boyhood and the monuments of his long-deceased mine-superintending father. Without attempting to characterize the correctness of the author's coloring of mining conditions, there is no question he has compressed some hair-raising adventures and episodes in a gripping narrative. The book has been published by D. Appleton & Co., New York, and the price is \$2.

New Books Received

Non-Metallic Inclusions in Iron and Steel. By Carl Benedicks and Helge Löfquist. 311 pages, 6 x 9¼ in., illustrated. John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price, \$8.

Quantity and Economy in Manufacture. By Fairfield E. Raymond. 375 pages, 6 x 9¼ in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$4.

High-Speed Steel. By Marcus A. Grossmann and Edgar C. Bain. 178 pages, 6¼ x 9¼ in., illustrated. John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price, \$3.50.

World Minerals and World Politics. By C. K. Leith. 213 pages, 5¼ x 7½ in. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$2.

The Autobiography of an Engineer. By William LeRoy Emmet. 213 pages, 5¼ x 8½ in., illustrated. Port Orange Press, Albany, N. Y.

Punches, Dies and Tools for Manufacturing in Presses. Fourth edition. By Joseph V. Woodworth. 538 pages, 5¼

8 1/2 in., illustrated. Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, \$5.

Materials Handbook. Second edition. By George S. Brady. 588 pages, 4 1/4 x 7 in., illustrated. McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, \$5.

Budgetary Control in Manufacturing Industry. 180 pages, 6 x 9 in., illustrated. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$3.

A Picture of World Economic Conditions at the Beginning of 1931. 349 pages, 6 x 9 1/4 in. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$3.

Materials of Industry. By Samuel Foster Mersereau. 478 pages, 6 x 8 1/4 in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$2.

Journal of the Institute of Metals. Vol. 44. 880 pages, 5 1/2 x 8 1/2 in., illustrated. Published by the Institute, 36 Victoria Street, Westminster, London, S. W. 1, England.

The Psychology of the Inventor. By Joseph Rossman. 252 pages, 6 x 8 1/2 in. The Inventors Publishing Co., 1266 New Hampshire Avenue, Washington. Price, \$3.

State and Local Taxation of Property. 245 pages, 6 x 9 1/4 in. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$2.50.

Mechanical World Electrical Pocket Book. 332 pages, 4 1/4 x 6 1/4 in., illustrated. Published by Emmott & Co., Ltd., 65 King Street, Manchester, England. Price, 1s. 6d.

American Society for Testing Materials. Tentative Standards: 1930. 1336 pages, 6 x 9 in., illustrated. Published by the American Society for Testing Materials, 1315 Spruce Street, Philadelphia. Price, \$8.

Forty-fourth Annual Report of the Interstate Commerce Commission. 1930. 338 pages, 6 x 9 1/4 in. Published by United States Government Printing Office, Washington. Price, 75c.

American Institute of Mining and Metallurgical Engineers. Transactions: 1930. 485 pages, 6 1/4 x 9 1/4 in., illustrated. Published by the Institute, 29 West Thirty-ninth Street, New York. Price, \$2.50.

American Society for Testing Materials. Standards: 1930. Part I—Metals. 1000 pages, 6 1/4 x 9 1/4 in., illustrated. Standards: 1930. Part II—Non-Metallic Metals. 1214 pages, 6 1/4 x 9 1/4 in., illustrated. American Society for Testing Materials, 1315 Spruce Street, Philadelphia. Price, both parts, \$14.

Patent Law. By Fred H. Rhodes. 207 pages, 5 1/4 x 8 1/4 in. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$2.50.

Rationalization of German Industry. 182 pages, 6 1/4 x 9 1/4 in. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, \$3.

Conversion Equivalents in International Trade. By Stephen Naft. 357 pages, 6 x 9 in. Published by the Commercial Museum, Philadelphia. Price, \$5.

Proceedings of the American Society for Testing Materials, 1930. Part II—Technical Papers. 1085 pages, 6 x 9 in., illustrated. Published by the Society, 1315 Spruce Street, Philadelphia.

Journal of the Iron and Steel Institute. Vol. 72. 744 pages, 5 1/2 x 8 1/2 in., illustrated. Published by the Institute, 28 Victoria Street, London, S. W. 1, England.

Engineering Metallurgy. By Bradley Stoughton and Allison Butts. 498 pages, 6 1/4 x 9 1/4 in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$4.

Modern Diesel Engine Practice. By Orville Adams. 656 pages, 6 1/2 x 9 1/2 in., illustrated. Norman W. Henley

Publishing Co., 2 West Forty-fifth Street, New York. Price, \$6.

The Modern Steam Turbine. By E. A. Kraft. 201 pages, 7 1/4 x 10 1/2 in., illustrated. VdI-Verlag G.m.b.H., Berlin, NW 7, Germany.

Soviet Foreign Trade. By J. M. Budish and Samuel S. Shipman. 276 pages, 5 1/2 x 7 1/2 in. Horace Liveright, Inc., New York. Price, \$2.50.

The United Kingdom, An Industrial, Commercial and Financial Handbook. 953 pages, 6 1/4 x 9 1/4 in. Government Printing Office, Washington. Price, \$1.75.

Policy and Ethics in Business. By Carl F. Taeusch. 624 pages, 6 1/4 x 9 1/4 in. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$5.

Mechanical World Year Book. 358 pages, 4 1/4 x 6 1/4 in., illustrated. Published by Emmott & Co., Ltd., 65 King Street, Manchester, England. Price, 1s. 6d.

Will the White Collar Turn Red? By W. M. Horner. 171 pages, 5 1/2 x 8 in. Watson Publishing Co., 412 East Eleventh Street, Los Angeles, Cal. Price, \$2.

Readings in Industrial Psychology. By Bruce V. Moore and George W. Hartmann. 560 pages, 6 x 8 3/4 in., illustrated. D. Appleton & Co., 35 West Thirty-second Street, New York. Price \$5.

Principles of Pattern and Foundry Practice. By William H. Richards. 121 pages, 6 1/4 x 9 1/4 in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price \$1.60.

The Balancing of Machinery. By C. Norman Fletcher. 172 pages, 5 1/4 x 8 1/2 in., illustrated. Emmott & Co., Ltd., 28 Bedford Street, London, W. C. 2. Price 10s.

Industrial Relations: Administration of Policies and Programs. 114 pages, 6 x 9 in., illustrated. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price \$2.

Industrial Electrochemistry. By C. L. Mantell. 528 pages, 6 1/4 x 9 1/4 in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price \$5.

▲ ▲ ▲

Electronic Control of Machinery

(Concluded from page 1300)

A book of sizable proportions would be necessary to completely outline all of the industrial applications of electronic devices. In this series, the writer has tried to hold himself to problems that would be of special interest to readers having to do with manufacturing and machine shop work. Of course, some of the applications are of general interest to industry at large. As an instance, one might mention the automatic control of lighting by photo-electric tubes. When natural light reaches a certain critical value, the photo-electric tube automatically switches off the electric lights and switches them on again if need be. Thus in a passing storm, the lights are switched on and off at the correct moments. This has been found to reduce lighting bills considerably.

A factory engineer in Austria recently set up an electronic circuit that would detect large pieces of metal concealed under workmen's clothes. Upon leaving the factory door, they unwittingly passed through a large coil of wire connected to a special vacuum tube circuit. Little wonder that such versatile devices have a future that appears to be limited only by human imagination.

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Inquiry Is Improving

▲ ▲ ▲
ACTUAL Business Not
Much Better, However—
October the Poorest Month of
Depression Period
▼ ▼ ▼

OCTOBER was the poorest month for machine tool sales of the depression period, according to the report of the National Machine Tool Builders' Association, but there are hopes for a slight upturn in orders this month. The improvement, if any, will be slight as to sales, but there is a definite gain in the number of inquiries. It is apparent that a good many manufacturers are gathering information preparatory to purchase of new equipment, but it does not seem likely that

much business will materialize until signs of improvement are more widespread.

The index figure of the machine tool association for October sales is 44.5, compared with 56 in September. The three months' moving average also declined to 57.4 from 63.1 at the end of the previous month. Unfilled orders are represented by the figure 96.5, also a new low point, and shipments declined to 84.6 from 91.8 in September. Unfilled orders at the end of October were 1.14 times shipments.

There has been some placing of long-delayed orders, which, with the better feeling among many machine tool users, encourages the machine tool industry to believe that the turn in its business may not be far away. The end of the year, however, is traditionally a period of restricted equipment buying; consequently, not much of a change for the better is expected before January.

A continued active demand for repair parts is one of the brightest spots in the situation.

New York

While there is but little improvement in inquiry for machine tools, sellers in certain instances have received orders for equipment that has been under consideration since early this year. Apparently, current indications of business improvement are influencing a few buyers to place long-delayed orders. Award is expected shortly of a 4-in. engine lathe for the Navy Department, bids on which were opened Nov. 10. Meanwhile, the Navy Department is taking bids on two small lathes for San Francisco, quotations submitted f.a.s. Atlantic port. The Lycoming Mfg. Co., Williamsport, Pa., has closed on the few additional tools still pending on its recent list. The General Electric Co. continues a buyer of two and three tools each week.

New England

Business is confined to a few low priced tools and repair parts. The State of Massachusetts has not as yet made an award on shop equipment, bids for which were opened last week. The past week brought out practically no new prospects.

The Boston Transit Commission has purchased \$68,200 worth of ventilating fans for the East Boston tunnel from the Carlestone-Mace Engineering Co., Boston, and motors costing \$25,197 from the Lincoln Electric Co.

Chicago

There is evidence that many machine shops in and around Chicago are busier, especially those engaged in automobile parts manufacture. Offsetting this favorable news is the report that neither the Santa Fe nor the Union Pacific will issue lists this year. These railroads have for many years been active in the machine tool market. The Chicago Board of Education is taking prices on a 32-in. lathe.

Milwaukee

Machine tool business is making some progress toward recovery, judging by the character and volume of business booked the first half of November. One local company reports as much business in the first 10 days of the month as throughout October, while others have made somewhat smaller gains. Orders are coming from widely diversified lines.

Pittsburgh

Continued improvement in inquiry for machine tools is reported by dealers in this district, although most of them emphasize that the prospective business coming out is not of the type to result in immediate orders. It represents to a much greater extent the activity of buyers who see signs of business recovery and are beginning to plan operations for the future.

Outstanding industrial lists still are almost entirely lacking. No railroad

inquiry is before the trade and structural steel fabricators are doing little buying. Actual orders are scarce and usually represent single tools or repair parts.

Cleveland

Machine tool inquiry increased slightly the past week, but orders are still scarce. Although there is improved sentiment, this does not appear to be affecting the attitude of many prospective buyers, as the general disposition of those showing some interest in new equipment is to delay buying. The Westinghouse Electric & Mfg. Co. purchased two shears and three brakes for installation in its new refrigerator cabinet department at its Mansfield, Ohio, works. The War Department will take bids Nov. 1 for a drill pointing or grinding machine for the Air Corps, Wright Field, Dayton.

Cincinnati

Slightly improved inquiry, particularly for heavy tools, has brought a better feeling in this market. Bookings for light machines the past week were on a par with those in the preceding week. Orders for repair parts have increased slightly. Inquiry is largely from automobile manufacturers and, with reports of improvement in this field, machine tool builders expect better results than heretofore from quotations recently sent out.

AN IMPORTANT DECISION

concerning Chromium Plating

of vital interest to every present and
potential user of the chromium
plating process ⚙ ⚙

ON OCTOBER 20TH, 1931, there was rendered by Judge Edwin S. Thomas, of the District Court of the United States, an Opinion which is of vital interest to every individual or concern who is now practicing, or may contemplate the practice of, the art of commercial chromium plating.

THIS COURT held valid and infringed all claims in suit of U.S. Patent 1,581,188 granted April 20th, 1926 to Colin G. Fink and now owned by UNITED CHROMIUM, INCORPORATED, saying in part, as follows:

"In view of what has been said supra, all claims in suit are held valid and not inspired by the prior publications or by the prior art and not anticipated by the alleged prior uses."

COPIES of the complete text of the Opinion are available to those interested.

UNITED CHROMIUM, INCORPORATED will continue the policy of Licensing under its patents.

UNITED CHROMIUM, INCORPORATED

Executive Office: 51 East 42nd Street, New York City

DETROIT

SAN FRANCISCO

WATERBURY



◀ NEW YORK ▶

Superior Fireproof Door & Sash Co., 1811 Carter Avenue, Bronx, New York, manufacturer of metallic doors, sash, etc., plans two-story factory, 50 x 100 ft. Cost \$45,000 with equipment. Horace Ginsberg, 205 East Forty-second Street, architect.

Superintendent of Lighthouses, Third District, Staten Island, N. Y., asks bids until Nov. 23 for ten lighted buoy bodies and two whistle buoy bodies, complete with fittings, etc.; until Nov. 30 for quantity of bronze castings.

William Shary, 22 East Seventeenth Street, New York, architect, filed plans for two-story automobile service, repair and garage building, 77 x 108 ft. Cost \$100,000 with equipment.

Beacon Iron Works, Inc., Bronx, New York, organized by Philip Smith, 782 Pelham Parkway, Bronx, and Moe Breyer, 7 Highland Place, Yonkers, N. Y., to operate iron and steel fabricating works.

Signal Supply Officer, Army Department, Army Base, Brooklyn, asks bids until Dec. 1 for 778,000 ft. wire; until Dec. 4 for 200 wave-meters; until Nov. 24 for 560 voltmeters.

National Cash Register Co., Dayton, Ohio, has purchased property and equipment of Remington Cash Register Co., Ilion, N. Y., an interest of Remington Arms Co., for \$2,500,000. Works will be removed to Dayton.

Albany Port District Commission, 74 Chapel Street, Albany, N. Y., let general contract to H. G. Blessing, Albany, for transit warehouse in connection with dock extension. Cost over \$275,000 with equipment. This is part of terminal program for water and rail facilities, to include other storage and distributing buildings, docks, grain elevators, etc., to cost close to \$10,000,000 with equipment.

Apollo Blade Corp., New York, organized by John V. N. Barbarin, 210 West 101st Street, and Eugene W. Dutton, 10 Bayley Avenue, Yonkers, N. Y., capital \$250,000, to manufacture safety razor blades.

Bureau of Supplies and Accounts, Navy Department, Washington, asking bids until Dec. 1 for one motor-driven engine lathe and one electric arc welding set for Brooklyn Navy Yard.

John R. Thompson Agency, 8-23 Astoria Avenue, Long Island City, sold to Philadelphia interests forming shipbuilding and repair company, six acres at College Point, L. I., for shipyard. Group of one-story shops planned for reconditioning and repair of large ships, followed later by other buildings for construction of vessels. Cost over \$100,000.

Board of Education, Cliffside Park, N. J., contemplates installation of manual training equipment in two-story and basement high school addition. Cost \$230,000. R. J. Cadien, 545 George Road, architect.

Jersey City Coal Co., 374 Newark Avenue, Jersey City, N. J., asked bids on general contract for coal pocket. Cost over \$25,000 with equipment. William Neumann, 26 Journal Square, architect.

Bergen Art Metal Works, Inc., Englewood, N. J., organized to take over and expand company of same name, plant at 5 East Demarest Avenue. Frank and Joseph Heidelberg, principal incorporators.

Board of Education, Passaic, N. J., contemplates manual training department in two-story and basement high school addition. Cost \$700,000. Bids on general contract asked early next year. John F. Kelly, Post Office Building, architect.

◀ NEW ENGLAND ▶

B. F. Sturtevant Co., Hyde Park, Boston, manufacturer of mechanical draft equipment, blowers, etc., contemplates plant at Berkeley, Cal., on tract recently secured. Cost over \$350,000 with equipment.

Building Committee, Board of Education, Hamden, Conn., contemplates manual training department in new high school. R. W. Foote, New Haven, Conn., architect.

Green Mountain Oil Burner Co., Cambridge, organized with capital \$100,000 by William A. Gage, St. Johnsbury, Vt., and Frank Marion, Cambridge, to manufacture oil burners and oil-burning devices.

Ray State Abrasive Products Co., Westboro, Mass., plans two-story addition, 42 x 100 ft. Cost over \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 24 for two pneumatic chipping hammers for Boston Navy Yard.

School Board, Greenfield, Mass., plans manual training department in new junior high school. Cost \$375,000. Bids on general contract in about 90 days. Bernard Dirks, 278 Main Street, architect.

General Tire & Rubber Co., Akron, Ohio, acquired plant and business of Yale Tire & Rubber Co., New Haven, Conn. Will remove to Akron later. New Yale company being formed under same name to operate as subsidiary. Yale organization in receivership for about year.

Winchester Repeating Arms Co., New Haven, Conn. Federal Court ordered sale of plant and assets Dec. 15, minimum upset price \$4,000,000. Western Cartridge Co., East Alton, Ill., tendered offer and is scheduled to acquire. Will continue operation and plans new departments for manufacture of hardware products.

Connecticut Airplane & Glider Mfg. Co., Inc., Stamford, Conn., organized by F. O. Ernstmeier, Stamford, and Victor Dahlberg, Greenwich, Conn., capital \$50,000. To manufacture aircraft and parts.

H. E. Holbrook, 42 Rockdale Street, Worcester, Mass., will soon start work on drop forge shop.

Keene Foundry, Inc., Keene, N. H., has plans for pattern shop and other improvements.

◀ SOUTH ATLANTIC ▶

Comfort Spring Corp., Baltimore, Md., J. Rymland, president, recently organized, leased 13,000 sq. ft., at 1603-17 East Fairmount Avenue, for spring manufacturing plant.

Board of District Commissioners, District Building, Washington, asks bids until Nov. 30 for one 20-ton automatic truck scale; until Nov. 24 for cast iron lamp post parts, metal fixtures and fittings for post tops; until Dec. 8 for two one-story buildings, 100 x 148 ft. and 70 x 100 ft. for municipal incinerator plant.

Greensboro Coca-Cola Bottling Co., Greensboro, N. C., H. M. Draper, 621 Elm Street, in charge, asking bids on general contract for two-story bottling plant. Cost \$85,000 with equipment. Pringle & Smith, Norris Building, Atlanta, Ga., architects.

Visible Non-Refillable Bottle Stopper, Inc., Baltimore, organized by Herman R. Muinch, 47 West Oliver Street, and associates, capital \$25,000. To manufacture metal specialties.

R. J. Reynolds Tobacco Co., Winston-Salem, N. C., to begin erection soon on two one-story storage and distributing buildings, 110 x 240 ft. Cost \$100,000 with equipment. G. M. Foley, company architect.

Wright Machine Co., Granite Falls, N. C., recently organized by W. C. Wright, Granite Falls, and associates, capital \$100,000. Will operate general machine repair and parts works, with experimental shop.

Superintendent of Lighthouses, Customhouse, Baltimore, asks bids until Nov. 23 for water-tube boilers, fuel oil burning system, fuel oil tanks, etc., for lighthouse tender.

Piedmont Cold Storage Co., Law Building, Charlotte, N. C., Granzer Pierce, head, has authorized one-story cold storage and refrigerating plant. Cost about \$40,000 with machinery.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 25 for toggle switches, conduit fittings, 20 meter-testing blocks, 2700 lb. steel rivets, valves, brass pipe fittings, stove bolts, fuse clips, transformers, 3000 lb. washers, etc.

Delagrave Co., 829 Broadway, Newark, N. J., has authorized branch plant at Spartanburg, S. C., for production of engraved copper rolls, etc., for textile printing. Spartanburg Chamber of Commerce is interested.

Virginia Iron, Coal & Coke Co., Pulaski, Va., plans rebuilding part of machine shops recently damaged by fire.

Chief of Engineers, Army Department, Washington, asks bids until Nov. 25 for one-story fabricated metal building, 24 x 36 ft., for base at Fort Humphreys, Va.

R. H. Bozman, Inc., 1050 Gramby Street, Baltimore, will take bids soon for addition to refrigerating and cold storage plant. Cost over \$40,000 with equipment. James R. Cox, 4547 Harford Road, architect.

◀ PHILADELPHIA ▶

Atlantic Refining Co., 260 South Broad Street, Philadelphia, carrying out expansion and improvements at oil refinery, Franklin, Pa. Cost over \$2,000,000.

Rome Co., 2025 Washington Avenue, Philadelphia, manufacturer of bed springs, etc., leased 20,000 sq. ft., in building at Delaware and Tasker Street, for storage and distributing unit.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 24 for one motor-driven horn type power press, quantity electric motors, controllers, resistors, etc., aluminum alloy tubing, one electric baking oven for Philadelphia yard.

Pottstown Borough School District, Pottstown, Pa., plans manual training department in one and three-story junior and senior high school, 297 x 323 ft. Cost over \$300,000. Hasness & Albright, Pottstown, architects.

Landis Program Clock Co., Waynesboro, Pa., organized by John G. Mumma and Chester B. Snively, Waynesboro, capital \$50,000. To manufacture electric clocks and mechanisms and mechanical devices.

City Council, Burlington, N. J., contemplates installation of electric-operated pumping machinery and auxiliary equipment for municipal sewer plant. Fund of \$150,000 being arranged.

Armstrong Cork Co., Lancaster, Pa., manufacturer of flooring, insulation products, etc., contemplates new plant at Shell Point, near Berkeley, Cal., where site recently was acquired. Cost close to \$1,000,000 with machinery. Henry Boettcher, address noted, company engineer.

Refined Oil Products Corp., Wilkes-Barre, Pa., organized by Dr. Charles L. Shafer, 219 North College Avenue, Kingston, Pa., and Donald O. Coughlin, Coal Exchange Building, Wilkes-Barre. To operate oil and gasoline refinery.

Pennsylvania Petroleum Products Co., Water and Morris Streets, Philadelphia, leased space in Bailey Warehouses for storage and distributing branch.

School Committee, Shelbyville, Del., contemplates manual training department in two-story and basement high and grade school, 130 x 190 ft. Bids asked on general contract. Cost about \$200,000. E. W. Martin, duPont Building, Wilmington, Del., architect.

Klein Stove Co., Philadelphia, which operates as subsidiary companies Caloric Gas Stove Works and Topton Foundry Co., has acquired plant and property of Freed Heater Co., Collegeville, Pa., and has resumed operation of plant.

◀ PITTSBURGH ▶

Emblem Oil Co., Warren, Pa., subsidiary of United Refining Co., Warren, plans oil storage and distributing plants in Eastern centers. Cost \$200,000 with equipment. Parent company is carrying out expansion and improvements at oil refinery. Cost over \$400,000 including machinery.

Department of Public Works, City-County Building, Pittsburgh, asks bids for rental to city of one auto crane with clamshell bucket, 10 jackhammer drills, 10 sets steel drills, power grader, pumps, six air compressors, tractors, two gasoline convertible shovels or cranes, and other equipment.

Murray Copper & Bronze Co., Pittsburgh, organized by M. F. and F. M. J. Murray, 4811 Ellsworth Avenue, to manufacture bronze, copper, brass and other metal castings.

Oil Well Supply Co., Clark Building, Pittsburgh, manufacturer of oil well drilling machinery, etc., leased five-story building at Dallas, Tex., for factory branch, storage and distributing plant. Will occupy early in 1932.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Dec. 1 for two motor-driven milling machines, one with attachments, for Charleston, W. Va., yard.

Niles W. Atterbury, 124 South Highland Avenue, Pittsburgh, and associates organized Atterbury Products Co. To manufacture valves, fittings, tools and other products. Allen H. Kerr, 1108 Commonwealth Building, is interested.

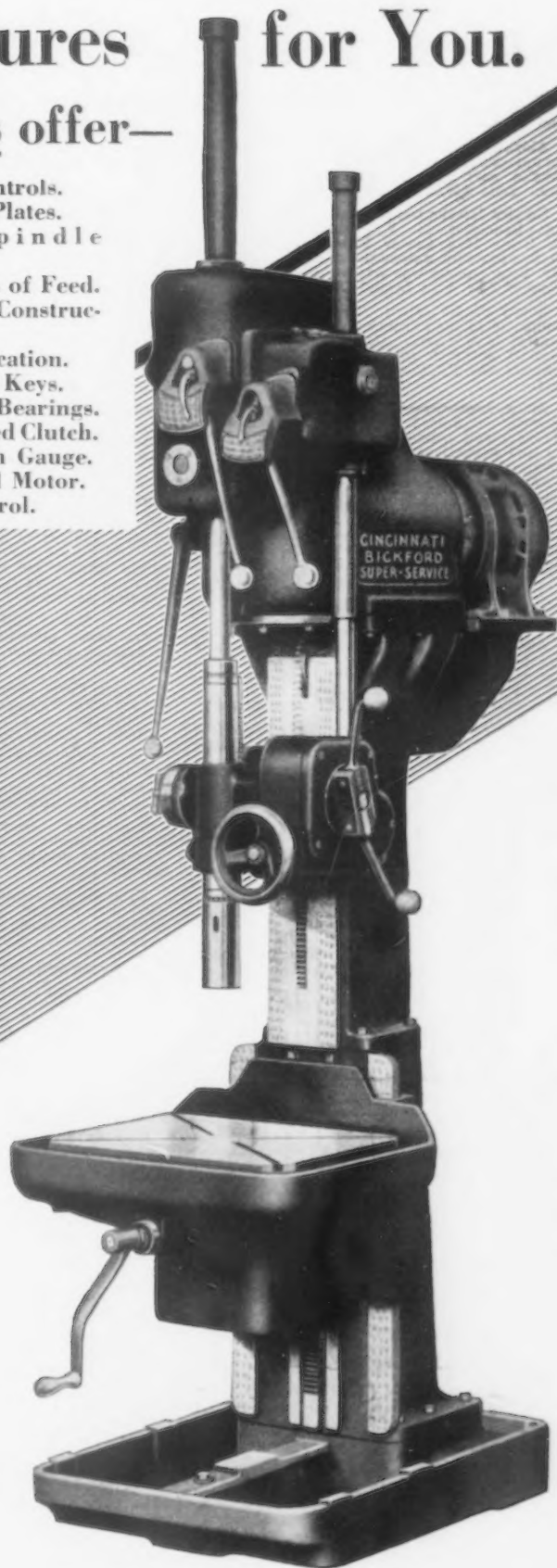
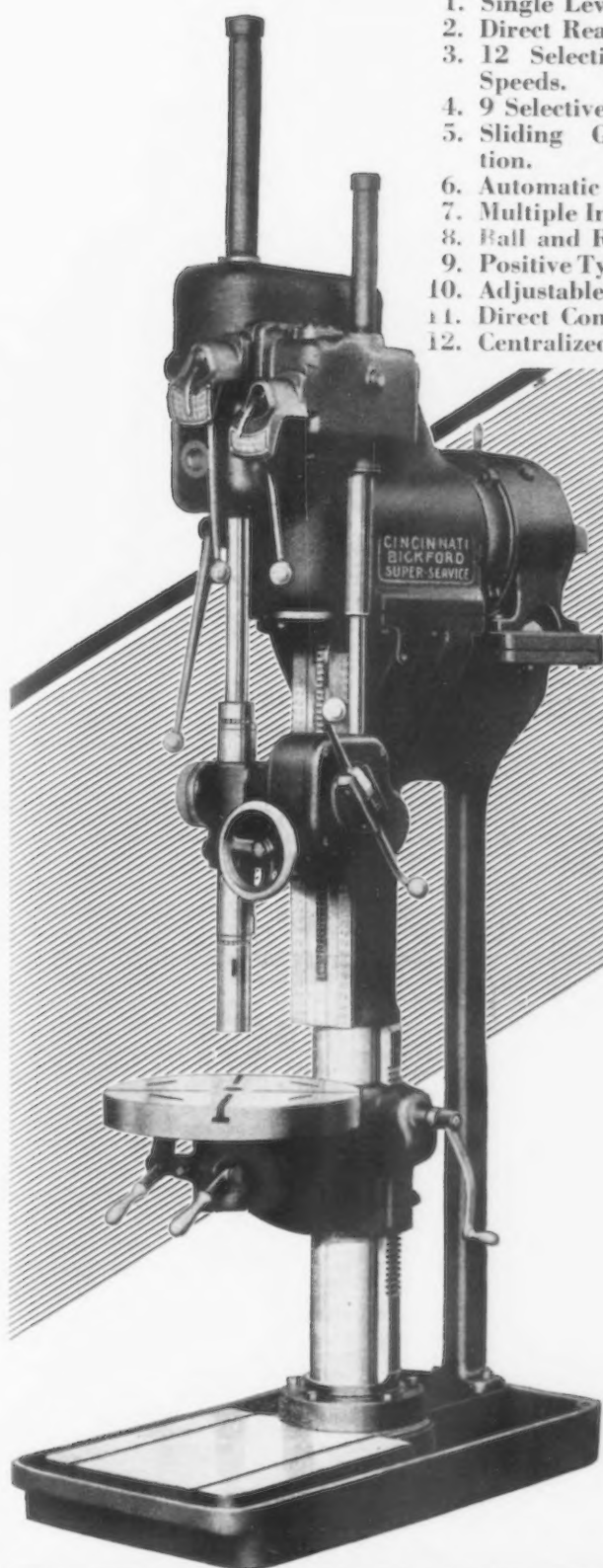
American Car & Foundry Co., Berwick, Pa., secured order for 500 subway cars for Board of Transportation, New York, and will add about 1500 men to working force.

Union Car Wheel Works, Thompson Run, Pittsburgh, increasing production with recall of about 100 men.

Money Making Features for You.

New Super Service Uprights offer—

1. Single Lever Controls.
2. Direct Reading Plates.
3. 12 Selective Spindle Speeds.
4. 9 Selective Rates of Feed.
5. Sliding Gear Construction.
6. Automatic Lubrication.
7. Multiple Integral Keys.
8. Ball and Roller Bearings.
9. Positive Type Feed Clutch.
10. Adjustable Depth Gauge.
11. Direct Connected Motor.
12. Centralized Control.



Write for booklet U-20

The Cincinnati Bickford Tool Company, Oakley, Cincinnati, Ohio

◀ BUFFALO ▶

Spring Perch Co., Stratford, Conn., manufacturer of automobile leaf springs, will build two one-story plants in Lackawanna district, Buffalo. Cost \$125,000 with equipment. Stratford works will be removed to new plant and capacity increased.

Aldrich Mfg. Co., 55 Illinois Street, Buffalo, manufacturer of restaurant equipment, will rebuild part of plant recently destroyed by fire. Loss \$40,000 with equipment.

Empire Development Corp., E. & B. Building, Rochester, N. Y., organized by Leland D. Bray, 1828 Culver Road, and associates, to manufacture automatic heating equipment. Mr. Bray's name was erroneously given in our issue of Nov. 5 as Leland D. Brady.

Board of Education, Clinton, N. Y., contemplates manual training department in new central high school. Cost \$275,000. Bids on general contract early next month. A. F. Gilbert, 358 Fifth Avenue, New York, architect.

State Line Transit Co., Bolivar, N. Y., recently organized by Wallace E. Sawyer, Bolivar, and associates, plans installation of oil and natural gas gathering system in Allegheny oilfields, with storage and distributing plants.

New York Central Electric Corp., 89 East Avenue, Rochester, N. Y., plans extension in power lines for service at Jasper, Troupsburg and vicinity, including power substation facilities.

◀ CLEVELAND ▶

Avery Paper Corp., Avery, Ohio, recently organized by C. L. Hoag, Sandusky, Ohio, and others, has acquired two two-story units, 45 x 500 ft. and 55 x 165 ft., for paper mill, developing capacity over 600 tons monthly.

Eaton Axle & Spring Co., East Sixty-fifth Street and Central Avenue, Cleveland, manufacturer of automobile axles, springs, etc., let general contract to Crowell & Little Construction Co., Hanna Building, for one-story addition, 160 x 412 ft. Cost over \$150,000 with equipment. George S. Rider Co., Marshall Building, architect and engineer.

Porcelain Tile Co., 228 North LaSalle Street, Chicago, manufacturer of steel-enameled wall tile, has removed headquarters to plant of Youngstown Pressed Steel Co., Warren, Ohio, of which it is a subsidiary.

American Can Co., City Park Avenue, Toledo, Ohio, is developing maximum output, with day and night schedules.

Warren Tool & Forge Co., Warren, Ohio, manufacturer of malleable iron and steel products. Frank W. Boyle named receiver.

◀ GULF STATES ▶

United States Engineer Office, Mobile, Ala., asks bids until Nov. 24 for one complete Diesel-electric generating set with accessories and switchboard.

Mississippi Portland Cement Co., organized by Andrew Fitzpatrick, Barrone Building, New Orleans, and associates, plans cement mill in northeastern part of Mississippi, with power plant and machine shop. Will use natural gas for operation, secured from Monroe, La., field. Cost about \$1,000,000 with equipment. B. R. Alford, Canal Bank Building, New Orleans, will be an official of company and engineer.

Board of City Commissioners, Borger, Tex., received bid from Joseph Greenspon's Sons Iron & Steel Co., 3130 North Hall Street, St. Louis, for installing municipal natural gas system at \$125,000. Contract will be made with Huber Petroleum Co. for supply.

Board of Regents, University of Texas, Austin, engaged Matthews & Kenan, Smith-Young Tower, San Antonio, Tex., engineers, to prepare plans for engineering building. Cost over \$250,000 with equipment. Paul P. Cret, 112 South Sixteenth Street, Philadelphia, consulting architect.

Joseph B. Neel, Big Spring, Tex., is interested in project to build lime-manufacturing plant on 300-acre tract near city. Cost over \$90,000 with equipment.

Board of Education, San Antonio, Tex., contemplates installing manual training department in junior-senior high school for negroes. Cost \$150,000 with equipment.

Swift & Co., Union Stock Yards, Chicago, plan two-story and basement packing plant, 95 x 140 ft., at Mobile, Ala. Cost about \$85,000 with equipment.

City Council, Galveston, Tex., will build hangar with shop facilities, administration

building and other field units for municipal airport. Cost over \$45,000. Jesse B. Johnson in charge.

John M. Zeesman Mica Co., Lineville, Ala., John M. Zeesman, head, leased building of Lineville Farmers Warehouse Co. for grinding, washing, drying and other operations.

Pan-American Airways, Inc., 122 East Forty-second Street, New York, authorized one-story hangar, 140 x 140 ft., with repair shop, at Dinner Key Base, near Miami, Fla. Cost about \$65,000 with equipment. B. W. Reeser, engineer in charge.

City Council, Wichita Falls, Tex., has asked bids for installation of natural gas system. Cost over \$500,000 with booster stations, pipe lines, etc.

Unit Stove & Furnace Co., Birmingham, is operating on full time in all departments, with full working force.

◀ CHICAGO ▶

Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, let contract to G. A. Johnson & Sons, 730 Rush Street, for rebuilding one-story coach and repair shops, 210 x 360 ft., at Aurora, Ill., recently destroyed by fire. Cost about \$350,000 with equipment.

Duluth Steam Corp., Duluth, Minn., J. J. Dwyer, general manager, has had plans approved by city for eight-story central steam power plant. Cost \$1,500,000 with equipment. Sullivan & Orrfalt, Palladio Building, mechanical engineers.

A. D. Burtis and Gustav Nissen, Webster City, Iowa, operating meat packing plant, will make extensions and improvements. Cost about \$100,000 with equipment.

Signal Corps Procurement District, Army Department, Chicago, asks bids until Nov. 24 for quantity of terminal boxes, jacks, plugs, mounting plates, etc.

Campbell-Buchanan Corp., 5 North Wabash Avenue, Chicago, organized by Harry N. Wyatt and Maurice A. Riskind, to manufacture aircraft and automotive equipment.

Homestake Electric Co., Woydak, Wyo., plans transmission line from power plant to Homestake mining district, Lead, S. D. Cost about \$400,000.

Colorado Associated Oil Co., Denver, operated by Midwest Refining Co., 910 South Michigan Avenue, Chicago, and other oil interests, plans development of new oilfields on 17,000-acre tract at North Fort Morgan Dome, with installation of drilling and power equipment, pipe lines, oil storage and distributing facilities. Cost over \$250,000.

Rath Packing Co., Sycamore and Elm Streets, Waterloo, Iowa, meat packer, let contract to H. A. Main Construction Co., Marshall Place Building, for four-story and basement addition, 60 x 132 ft. Cost \$100,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, architect and engineer.

City Council, Monmouth, Ill., plans installation electric-operated pumping machinery, conveying equipment, etc., in new sewage disposal plant. Cost \$100,000. Kinsey Engineering Co., Pekin, Ill., consulting engineer.

Board of Education, Elgin, Ill., contemplates manual training department in new school. Cost \$200,000. General contract let to Vagtborg Construction Co., 251 West Seventy-ninth Street, Chicago. William B. Ittner, Inc., 3615 Olive Street, St. Louis, architect.

Shafer Bearing Corp., Chicago, has moved to 621 South Kolmar Avenue.

◀ MILWAUKEE ▶

Beloit Iron Works, 815 Second Street, Beloit, Wis., placed general contract with Cunningham Brothers, Strong Building, local, for two-story pattern shop extension, 60 x 150 ft. Cost about \$40,000 completed.

Barber-Colman Co., Milwaukee branch, 2561 North Downer Avenue, leased building to be erected at 912 North Broadway for one-story machine shop addition, 30 x 60 ft.

Milwaukee Board of School Directors, F. M. Harbach, secretary and business manager, closes bids Nov. 25 for construction and equipment of dust collection system in Lincoln High School.

Marathon Electric Mfg. Co., Wausau, Wis., manufacturer of fractional horsepower motors, had average daily output of 225 units in October, compared with 185 in September and 50 a year ago. Expects to increase to daily average of at least 350 by end of year. Outlook for new year promising. J. J. Wall, general manager.

◀ CINCINNATI ▶

K. D. Lamp Co., 112 West Third Street, Cincinnati, manufacturer of automobile lamps, leased for expansion two-story and basement building, 22 x 130 ft., to be erected at 1012 Wesley Avenue. Cost about \$45,000 with equipment. Glazier & Morlidge, Broeman Building, engineers.

City Council, Easton, Ohio, has been authorized to issue bonds for \$233,000 for municipal electric light and power plant.

Department of Public Welfare, Ninth and Oak Streets, Columbus, Ohio, John McSweeney, director, rejected recent bids for steam generating equipment for power plant, State penitentiary. Will ask new bids soon. C. E. Morrow, consulting engineer, division of engineering.

Louisiana Refining Co., 1115 Southern Street, Memphis, Tenn., let contract to H. H. Walsh, Derrmon Building, for oil storage and distributing plant.

Di-Mold Castings Co., Dayton, organized by C. R. Heberling, Third National Bank Building, and R. E. Engle, Dayton, to manufacture castings.

Board of Education, Nashville, Tenn., plans manual training department in three-story and basement high school, 210 x 270 ft., in East Nashville. Cost \$500,000. General contract let to V. L. Nicholson & Co., Independent Building, Marr & Holman, Stahlman Building, architects.

Warner Brothers Pictures, Inc., 321 West Forty-fourth Street, New York, will build two-story automobile service, repair and garage building, capacity 200 cars, in connection with motion picture building at Nashville, Tenn. Cost over \$500,000. Marr & Holman, Stahlman Building, architects.

City Council, Piqua, Ohio, has been authorized to issue bonds for \$810,000 for municipal electric light and power plant. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., engineer. W. G. Whitney, city manager.

◀ DETROIT ▶

Board of Trustees, Michigan State College, East Lansing, Mich., plans extensions in power plant, with installation of boilers, stoker and accessories. Cost \$65,000.

United States Coast Guard, Gas Light Building, Milwaukee, will soon take bids for pneumatic pressure water station near Montague, Mich., including steel pressure tank, 300-gal. capacity, gasoline-driven pumps, accessories.

Clarke Sanding Machine Co., Muskegon, Mich., organized to take over and expand A. A. Clarke Co., Muskegon, manufacturer of portable sanding machines, parts, etc. Thomas B. Bennett and Richard E. Slayter, principal incorporators.

Timken Detroit Axle Co., Clark Avenue, Detroit, plans improvements and extensions in one of plant units, with facilities for production of silent automatic oil burners and parts. Cost about \$50,000.

William J. Breen Gravel Co., Grand Rapids, Mich., organized by William J. Breen, 1623 Grandville Avenue, and others, capital \$150,000. Company is erecting new sand and gravel washing, storage and distributing plant. Cost about \$100,000 with machinery. William H. Allswede, Hersey, Mich., is interested.

Cadillac Tool Co., 2016 Franklin Street, Detroit, leased property at 150 Grand Avenue, Mount Clemens, Mich., for new plant. Detroit works are being removed. New equipment will be installed for increased output.

Allied Die Cast Co. of America, Inc., 7420 Melville Avenue, Detroit, contemplates installation of equipment for die-casting, pumping machinery, etc.

City Council, Ann Arbor, Mich., has plans for municipal automobile service, repair and garage building and one-story storage and distributing plant.

Langlois Grinding Co., 3340 Lambie Place, Detroit, organized with capital of \$25,000 to manufacture grinding equipment, tools, jigs, etc. Fred Langlois, 1532 Twenty-third Street, head.

Schwarze Electric Co., Adrian, Mich., manufacturer of automobile parts, is stepping up production and recently increased working force 20 per cent.

Metalclad Products, Inc., Detroit, has changed its name to Metalclad Airship Corp.

An assured
protection against

Atmospheric
Corrosion
Copper-Steel pipe



Here is one important fact undeniably established regarding pipe. A moderate copper content in the steel adds considerably to the durability of pipe, under certain conditions. Specifically, this advantage is marked and unmistakable under "atmospheric exposure", or, under alternate wet and dry conditions, whether caused by the outdoor elements or not. Examples are the soil, waste, vent lines and rain leaders of large buildings, homes or factories.

For all pipe services subject to such exposure, NATIONAL Copper-Steel Pipe has the approval of leading architects and engineers. Write for Bulletin 11, describing NATIONAL Copper-Steel Pipe—

The Original Copper-Steel Pipe

LOOK FOR THE GREEN COLOR!

NATIONAL Copper-Steel Pipe is marked as follows: Black Pipe—Smaller sizes colored green. Larger sizes, two green stripes running lengthwise. Galvanized Pipe—All sizes, two green stripes running lengthwise.

NATIONAL TUBE COMPANY

Subsidiary of United States Steel Corporation
PITTSBURGH, PA.

NATIONAL COPPER-STEEL PIPE

◀ ST. LOUIS ▶

City Council, Oklahoma City, authorized one-story hangar, 120 x 120 ft., with shop and reconditioning facilities, at municipal airport. Cost \$35,000 with equipment. L. M. Bush, engineer.

Sieloff Packing Co., Newstead and Natural Bridge Avenues, St. Louis, meat packer, plans addition, 75 x 80 ft., for condenser unit. Cost over \$30,000 with equipment. Wedemeyer & Nelson, Wainwright Building, architects.

Steele Compress Co., Steele, Mo., plans rebuilding of cotton compress recently destroyed by fire. Loss over \$100,000 with machinery.

City Council, Mankato, Kan., plans installation of electric-operated pumping machinery in connection with waterworks extensions and improvements. Bonds for \$60,000 voted.

State Board of Regents, Lincoln, Neb., is asking bids on general contract for one-story shop, 65 x 100 ft., at State School of Agriculture, Curtis, Neb. Cost \$30,000 with equipment. Meginnis & Schaumburg, Federal Trust Building, Lincoln, architects.

State Highway Commission, Jefferson City, Mo., has let general contracts for 14 one-story repair and maintenance buildings for equipment at various locations, each shop 41 x 80 ft. T. H. Cutler, chief engineer.

Board of Works, Kansas City, Mo., secured appropriation of \$1,000,000 for extensions and improvements in municipal waterworks, including installation electric-operated pumping machinery, power equipment, pipe lines, etc.

Quachita Quarries, Little Rock, Ark., E. B. Bird, 901 North Pine Street, engineer, has secured over 1500 acres of stone properties in Quachita National Forest, Montgomery County. Company plans installation of quarrying, conveying and other equipment.

Fort Scott Hydraulic Cement Co., Fort Scott, Kan., will soon take bids for rebuilding mill recently destroyed by fire. Loss over \$50,000 with equipment. Howard Thomas in charge.

Quartermaster Department, United States Army, Fort Sill, Okla., received low bid from Walter M. Vernon, Kennedy Building, Fort Smith, Ark., for double hangar unit with shop quarters, 128 x 308 ft., at \$58,290, and is scheduled to receive award. Robert O. Bradley & Co., Chickasha, Okla., consulting engineers.

Barnsdall Corp., Barnsdall, Okla., plans gasoline storage and distributing plant at re-

finery. Cost about \$40,000 including equipment.

Laclede Gas Light Co., Eleventh and Olive Streets, St. Louis, is carrying out expansion and improvements at artificial gas plants. Cost about \$400,000.

◀ INDIANA ▶

Studebaker Corp., South Bend, will install equipment in engine and engine block departments. Cost over \$250,000. Company recently placed order for other tools totaling about \$200,000.

Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, will soon begin expansion and modernization program at Hammond refinery, including equipment replacements, new units and machinery. Cost close to \$8,000,000.

Hays Mfg. Co., South Bend, organized by Roy W. Hays and Harry A. Richwine, South Bend, to manufacture mechanical and electrical equipment.

Hammond Lead Works, 1200 West 165th Street, Hammond, awarded general contract to F. C. Rowley Co., 5231 Hohman Avenue, for one-story addition. Cost over \$30,000 with equipment.

Kuhner Packing Co., Muncie, meat packer, will build two-story and basement plant, 75 x 130 ft. Cost about \$70,000 with machinery.

International Steel & Iron Co., Inc., Evansville, organized to take over plant and business of company of same name, operating steel fabricating works. Plans expansion and change of name to International Steel Co. Fred O. Weber, William J. Walker, Henry Bohnsack, heads.

◀ PACIFIC COAST ▶

Eastern Airplane Mfg. Co., San Gabriel, Cal., care National Airport Engineering Co., 775 East Washington Street, Los Angeles, engineer, plans three one-story units, totaling 120,000 sq. ft., for manufacture of airplanes and parts. Cost about \$100,000 including equipment.

Los Angeles Soap Co., 617 East First Street, Los Angeles, asked bids on general contract for one-story and basement addition, 140 x 268 ft. Cost over \$90,000 with machinery. Morgan, Walls & Clement, Van Nuys Building, architects.

Orange County Refining Co., Newport Beach, Cal., plans improvements in oil refinery, including additional machinery.

Vallejo Electric Light & Power Co., Vallejo, Cal., plans power substation. Cost \$100,000 with equipment. W. A. Jones, 403 Alameda Street, engineer.

Goldhill Hardware Mfg. Co., Los Angeles, organized by M. L. Hollis and B. E. Tuthill, Jr., to take over and expand company of same name with plant at 4040 Whiteside Street, manufacturer of hardware and other metal goods.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 1 for one motor-driven pipe-bending machine, quantity of machine screws and nuts, for Mare Island, Cal., navy yard; and for one motor-driven pipe-threading machine for San Diego yard.

Water Commission, Salem, Ore., has called special election Dec. 15 to approve bonds for \$2,500,000 for extensions and improvements in water supply system, including pumping machinery, power equipment, pipe lines, etc.

Washington Water Power Co., Spokane, Wash., plans automatic power substation at Lewiston, Idaho.

Upland Lemon Growers' Association, Fourth Street, Upland, Cal., L. R. Bradley, secretary, is considering packing plant, with conveying, packing, loading and other equipment, capacity 300 cars. Cost \$100,000 with machinery.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has plans for one-story equipment storage and distributing plant at Colusa, Cal. Cost \$30,000 with equipment.

W. C. Kirkpatrick, 124 West Fourth Street, Los Angeles, engineer, at head of project to build dry ice-manufacturing plant at Hanford, Cal. Cost over \$75,000 with machinery.

General Neon Products Corp., Los Angeles, care of Campbell & Campbell, 453 South Spring Street, attorneys, organized by William Hamburger, Los Angeles, and associates, capital \$200,000. To manufacture electric signs and displays.

◀ CANADA ▶

W. & R. Walsh, Ltd., Chatham, N. B., woodworking plant destroyed by fire. Loss \$100,000. Owners will rebuild.

Public Utilities Commission, London, Ont., will build two-story workshop 50 x 120 ft.

Rustless Steel Plane Makes First Flight



A rustless steel amphibian plane of the Savoia-Marchetti type made its first flight at Port Washington, N. Y., on Nov. 15. It was designed by the American Aeronautical Corp., and built by the Edward G. Budd Mfg. Co., Philadelphia, after about three years of experimental work. In building it, the Budd laboratories, under supervision of Col. E. J. W. Ragsdale, developed a method of

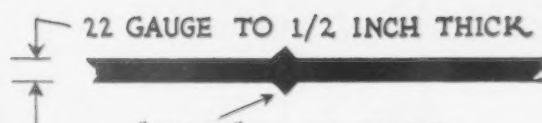
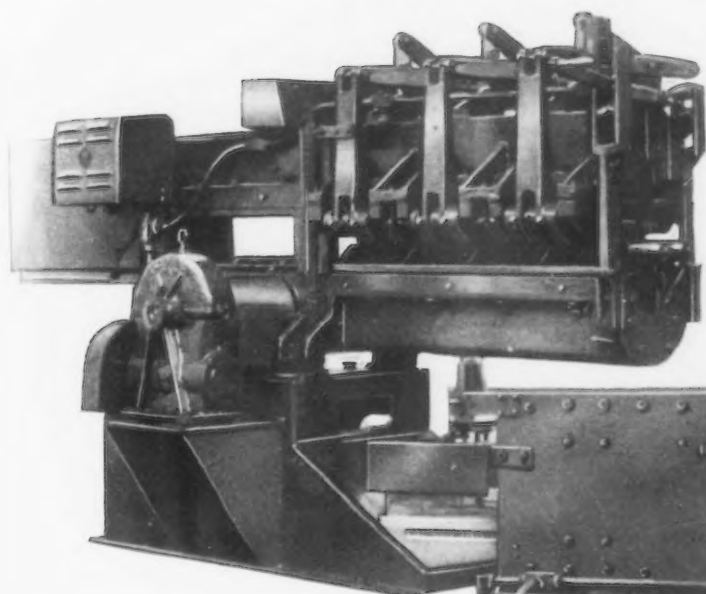
electric welding termed "shot" welding. The usual methods are said by the Budd company to have tended to impair the consistency of the rustless steel and reduce its strength. Non-magnetic properties of the alloy steel used are suggested as a desirable factor in airplane construction.

The plane is of the open-cockpit type, carries four passengers, has a wingspread of 34 ft. and weighs

1749 lb. It has a cruising speed of 100 miles an hour and a cruising radius of 400 miles. The Budd company suggests that rustless steel offers possibilities for aircraft, as it permits additional strength and reduced weight. Government laboratory tests have indicated that chrome-nickel alloy steel aircraft may be constructed of the usual weights, but with 12 to 20 per cent additional strength.

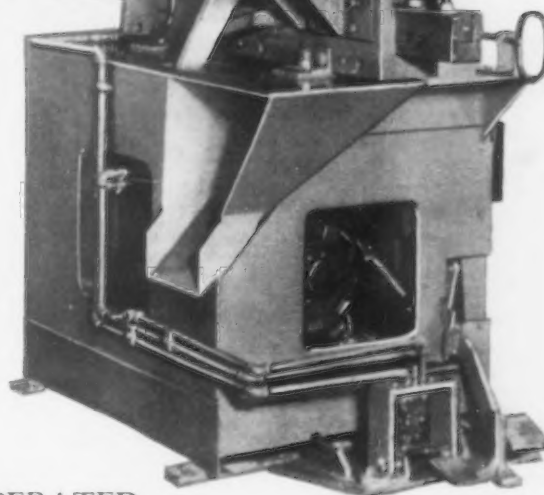
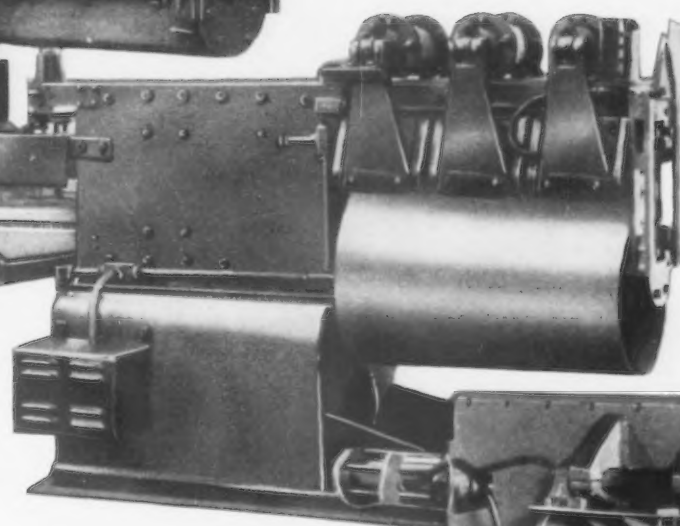
Federal

"FLASH" STRIPPERS



"FLASH" AS IT COMES FROM THE WELDER

"FLASH" STRIPPED



Since "Electrical Resistance Welding" has become the

WORLD'S BEST ASSEMBLY METHOD

Removing the "burr" or "flash" from finished or semi-finished articles is accomplished by specialized machines which "Federal" pioneered and now manufactures for all needs.

MECHANICALLY OR HYDRAULICALLY OPERATED

THE **Federal** MACHINE & WELDER COMPANY
ELECTRIC WELDERS OF ALL TYPES

Factory and Home Offices: Warren, Ohio

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Philadelphia—Bourse Bldg.

Pittsburgh—Rush Machinery Co.
San Francisco—Jenison Machinery Co.
St. Louis—304 Security Bldg.
Minneapolis—F. E. Satterlee Co.

Business as Others See It

Digest of Current Financial and
Economic Opinion

PREVALENCE of a better business sentiment is widely noted. *Financial Chronicle* couples it with diminishing credit and currency inflation—"a more important development than generally supposed"—and says "the conviction is steadily growing . . . that henceforth there will be gradual, even if only very slow, improvement."

Betterment in "the courage of business" is attributed by Col. Leonard P. Ayres to three things: "Such a slowing down of gold exports that recent shipments are of unimportant amounts; a decrease in money in circulation, which is evidence that doubt is being dispelled by confidence; a general stiffening in commodity prices," led by wheat.

Favorable signs mentioned by *Analyst* include the second and third above. The advance in wheat prices is said to be largely warranted by the statistical position of world supplies and future demand, but the permanence of the gain is questioned. A disturbing factor cited is a bad drop in factory employment and payrolls in October.

Commerce and Finance finds "no denying that the feeling is more

cheerful, and that the tendency is up rather than down. . . . The mood of the speculative public has changed." More than a dozen headlines taken from New York newspapers are quoted, to show widespread prevalence of a better public sentiment.

"Improvement since early October is more apparent in statistics not bearing directly upon the volume of business," is the way Harvard Economic Service puts it. But that organization sees "little possibility that business can get back to normal during 1932." Such dual depressions as the present, Harvard says, "occur only in times of monetary disturbance. So long as the situation is dominated by such a disturbance it is impossible to forecast the course of business."

"We are now in the second period of a dual depression marked by a monetary disturbance. . . . The end of such a depression must await removal of the specific cause which cut short the incipient revival and gave the depression its dual character. . . . It must wait until progress toward cure [of the world's financial troubles] is sufficient to end the fear of complete disaster, and restore confidence in

ultimate recovery through normal readjustments."

Recovery in bond prices is held by Alexander Hamilton Institute to "presage prosperity." But "the prices of finished goods must undergo a further reduction."

Looking ahead, C. F. Hughes, in *New York Times*, suggests profit-sharing as a means of smoothing out future business depressions. "Business must always be faced with recurrent crises so long as profits expand too greatly in times of inflation and the market for all products is restricted by the absence of a corresponding advance in wages. . . . Equal division in extra earnings [of corporations] to stockholder and worker alike . . . would in no wise destroy initiative or greatly reduce the profit incentive."

"Investors would receive somewhat less in times of high prosperity, but they would suffer much less in depressions. The average return should prove much higher, when it is considered what the improvement in general purchasing power would accomplish." . . . And this plan "should mitigate to a considerable degree the deep slumps in business, which profit very few persons."

Cost about \$40,000. Some contracts have been awarded. E. V. Buchanan is general manager.

Prolac, Ltd., formerly Asbestos Mfg. Co., Ltd., Lachine, Que., will install new equipment to cost \$100,000. Company will manufacture asbestos products, tile, shingle, marble, etc. Jacques Paradis is manager.

FOREIGN

Central Electricity Board, London, England, plans steel tower transmission lines with power substations and switching stations for connection of main electric generating stations from Berwick-on-Tweed to Fife, Yorkshire. Cost \$6,000,000.

Mitsubishi Co., Tokyo, Japan, considering fuel briquet manufacturing plant, capacity over 350,000 tons a year. Cost about \$300,000 with machinery.

Government of Straits Settlements, Singapore, Straits Settlements, plans civil aerodrome for airplanes and seaplanes at Singapore, with hangars, repair shops and other field units. Smaller airports planned at Taiping, Batu Pahat, Port Swettenham and other points. Entire cost about \$3,500,000 with equipment. All equipment purchases made through Crown Agents for Colonies, London, England.

Textile Machinery Makers, Inc., Acerrington, Lancashire, England, organized to take over six manufacturers of textile machinery in Lancashire district, will carry out development program. Sir George Bullock, director of Howard & Bullough, Ltd., Acerrington, one of units, heads new organization, with E. V. Haigh, managing director Hetherington & Sons, Ltd., Ancoats, Manchester, another unit in combine.

London, Midland & Scottish Railway, London, England, plans electrification of line from Barking to Upminster. Cost over \$2,000,000.

Office Changes and New Agencies

Foster Wheeler Corp., New York, has established a branch office at 720 Jackson Place, N. W., Washington, in charge of J. S. Malseed.

Beckwith Machinery Co., construction machinery dealers, Pittsburgh, has contracted to handle the complete line of shovels and cranes, made by Byers Machine Co., Ravenna, Ohio, in western Pennsylvania, southeastern Ohio and counties in West Virginia within 100 miles of Pittsburgh.

Geometric Tool Co., New Haven, Conn., has appointed Drake-Grau Tool & Mfg. Co., Ltd., 1520 East Slauson Avenue, Los Angeles, as its exclusive sales agent in the southern California district, covering all counties south of and including San Luis Obispo, Kings, Tulare and Inyo counties. The Tool Equipment Co., Los Angeles, for many years Pacific Coast representative of the Geometric company, has been dissolved.

Adler Steel Products Co., sales representative for Gauder, Paeschke & Frey Co., Milwaukee; Calumet Steel Co., Chicago, and Keystone Steel & Wire Co., Peoria, Ill., is now located in the Thorpe Building, Minneapolis.

Industrial Finances

Granite City Steel Co., for the nine months ended Sept. 30, reports net profit after depreciation, Federal taxes and other charges, of \$339,344, equal to \$1.16 a share, compared with \$689,159, or \$2.36 a share in the first nine months of 1930.

Pittsburgh Screw & Bolt Corp., reports net loss for the nine months ended Sept. 30, after

taxes, depreciation, interest and other charges, of \$208,354, against net profit of \$1,436,690, equal to 96c. a share, in the first nine months of 1930. Net loss in the third quarter was \$127,502, compared with net loss of \$84,044 in the preceding quarter, and net profit of \$187,211, or 12c. a share, in the third quarter last year.

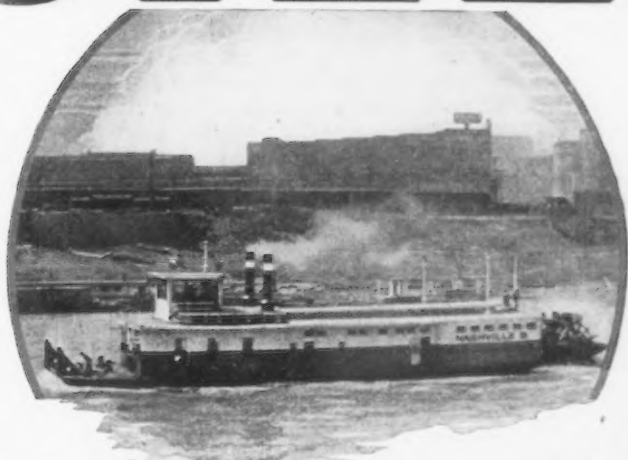
American Steel Foundries, for the nine months ended Sept. 30, reports a net loss after depreciation, taxes and minority interests, of \$155,707, against net profit of \$2,720,369, equal after preferred dividends, to \$2.40 a share on the common stock, in the first nine months of 1930. The company operated in the third quarter at a net loss of \$205,786, against a net profit of \$73,684, or \$1.16 a share, on the 7 per cent preferred stock, in the preceding quarter, and net profit of \$580,831, or 47c. a share on the common stock, in the third quarter last year.

Ludlum Steel Co. and subsidiaries in the nine months ended Sept. 30 had a net loss of \$38,347 after charges and taxes, compared with net loss of \$283,095 in the first nine months of 1930. In the third quarter of this year the company and its subsidiaries had a deficit of \$61,835, against a net profit of \$7,130, equal to 14c. a share on \$6.50 preferred stock, in the preceding quarter, and net loss of \$187,673 in the third quarter last year.

Jacking Method.—Armco Culvert Manufacturers Association, Middletown, Ohio. Catalog No. 7 describes Armco jacking method, used in installing conduits, drainage openings and passage-ways under streets, highways and railroads. No interruption to traffic and savings in construction costs are claimed.

STEEL

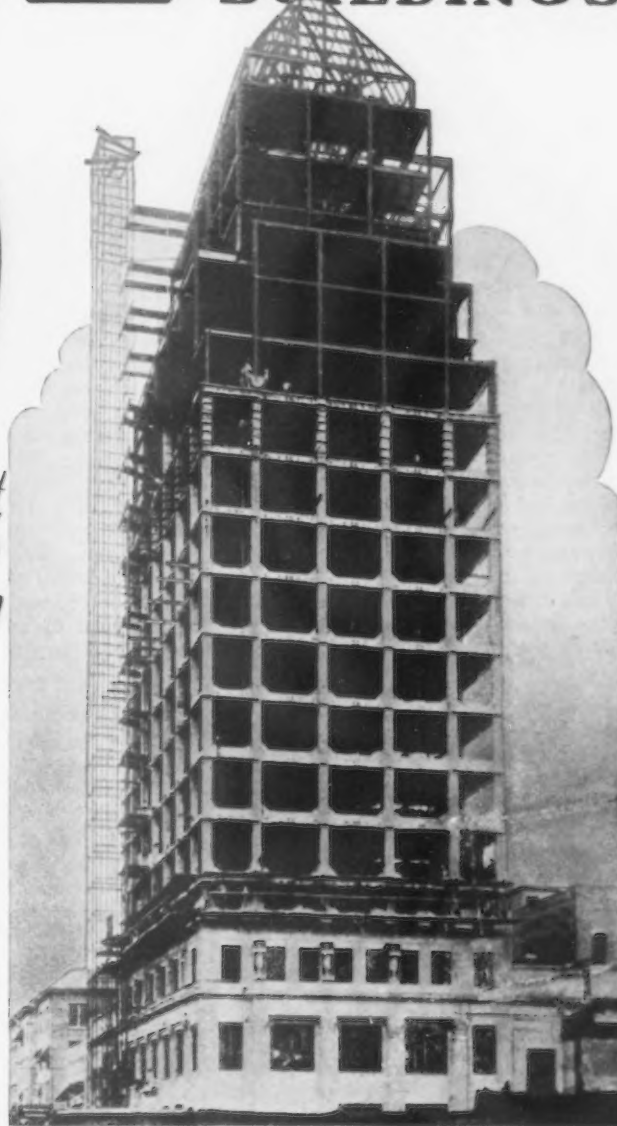
FOR BOATS BRIDGES OR BUILDINGS



Wherever there is a use for steel—Let
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figure on your requirements. Quality products backed by careful inspection—prompt shipments, with intelligent cooperation through understanding of the customer's needs—these are some of the reasons which make Tennessee a desirable source of supply.

Products: Structural Shapes, Plates, Bars and Small Shapes, Sheets (Blue Annealed, Black and Galvanized), Rails and Accessories, Forgings, Castings, Semi-Finished Products, Pig Iron.



Tennessee Coal, Iron & Railroad Co.

General Offices: Brown-Marx Bldg., BIRMINGHAM, ALA.

Subsidiary of United States Steel Corporation

US
STEEL

Forging Failures Avoided by Proper Heating

Burning, a serious and more common fault than is usually realized, and scaling, hitherto regarded as almost inevitable in steel forging, may be avoided by careful heating of the metal, with a consequent large saving by avoiding discards on inspection as well as a reduction of the danger of steel parts failing while in operation and endangering life or causing costly shut downs in plant operation, according to results of research done by Dr. D. W. Murphy and W. E. Jominy at the University of Michigan and given in a bulletin of the Department of Engineering Research.

Burning of steel occurs in a furnace when the temperature reaches a certain point and this burning temperature has been found to be lowered when free oxygen is present in the furnace atmosphere. The danger involved in burned forgings is that the damage is often invisible to the naked eye, but may be very serious in the center of the piece, and is only detected in broken parts by the microscope, which shows the minute crystals of the metal to be separated by

large spaces, with increased likelihood of breakage.

More accurate temperature control than is usually practised and firing furnaces with a slight over-supply of fuel to insure combustion of all free oxygen will diminish the burning danger by raising the burning point, Dr. Murphy found. Poor quality of finished products and the economic loss from scaling of heated steel surfaces is much greater than is commonly recognized. Its formation involves loss in metal weight, and if removed it involves extra labor costs while, if left and pounded into the metal, it causes weak spots as well as producing wrong sized parts through filling up or injury to dies. Scaling losses increase as the heating temperature rises and become very great at the melting points of the scales. Presence of sulphur in fuels used is also a more influential factor than is usually supposed in scale formation. Total avoidance of scale can be made by firing with a considerable excess of sulphur-free gas to use up all free oxygen, Dr. Murphy found, since scale is chiefly iron oxide. In general commercial practice with present furnaces this would be uneconomical, and points to the need of new furnace designs, he says.

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Pig Iron Imports Were Considerably Larger

Imports of pig iron into the United States in September are reported by the Department of Commerce at 5104 gross tons. This represents an increase of more than 63 per cent compared with the 3122 tons imported in August, the latter having been the smallest total for any month since early 1922. Compared with September, 1930, however, there has been a drop of more than 50 per cent.

In the nine months to end of September imports have aggregated 70,197 tons, a drop of about 22.5 per cent from the total in the nine months of 1930. The current total is the smallest for the first nine months of any year since 1921.

Almost 95 per cent of the September imports came from British India, this being a considerably larger proportion than has been customary. In

the nine months the imports from India aggregated 79 per cent of the total, with Netherlands, Sweden, Great Britain and Canada following in that order, but at a great distance behind. A year ago, India furnished in nine months about 76 per cent of the total, with Great Britain, Netherlands, Norway and Sweden following in that order, and Canada well down on the list.

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Ex-Cell-O Aircraft & Tool Corp., Detroit, has appointed Burton, Griffiths & Co., Ltd., Birmingham, England, as exclusive sales representatives in England to handle the company's line of drill jig bushings, internal grinding spindles and diamond boring machines. F. G. Lyon, 1549 Pelissier Street, Windsor, Ont., has joined the J. B. Morrison Machinery Co., Toronto, Canada, Ex-Cell-O's Canadian representatives, handling sales in the border cities adjacent to Detroit.

Trade Literature

At the Questa, New Mexico, mine of the Molybdenum Corporation of America about 40 tons of high-grade sulphide molybdenum ore is produced per day, which is concentrated by flotation and shipped to the company's plant in Pennsylvania for the manufacture of ferromolybdenum and calcium molybdate. The mining methods used at this operation are described in Information Circular 6514, by J. B. Carman, just published by the United States Bureau of Mines.

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An engineering manual on short-center drives using VIM flat leather belting under tension provided by the Rockwood motor base is offered for limited distribution by the E. F. Houghton Co., Philadelphia. The book, originally prepared for use by the company's field engineers, contains 152 pages of charts, tables and engineering data on 5000 standard drives ranging from 5 to 100 hp. Drives with idler pulley are included.

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"Tables and Charts of Specific Gravity and Hardness for Use in the Determination of Minerals" is the title of an 84-page pamphlet No. 34 in the engineering and science series of the Rensselaer Polytechnic Institute at Troy, N. Y. The authors are Joseph L. Rosenholtz and Dudley T. Smith of the department of geology and mineralogy.

♦ ♦ ♦

Combustion Engineering Corp., 200 Madison Avenue, New York, has issued a pamphlet, discussing the X-ray method of testing which is prescribed in the American Society of Mechanical Engineering code for welded boiler drums. An installation of X-ray equipment representative of the latest development in this field is described.

♦ ♦ ♦

United States Bureau of Mines, Washington, has issued a supplement to its monthly coal distribution report No. 2, covering distribution of by-product and beehive coke and fuel briquets. The report includes tables summarizing the quantity of each fuel consumed in each State, with classification by uses.

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Apex Smelting Co., Chicago, has developed an aluminum flux, which, in addition to cleansing aluminum of foreign ingredients, is said to dispel gases and oxides contained in the metal and absorbed in melting practice. Its mechanical properties bring to the surface furnace, crucible or pot scale, entrapped drosses, and liberate metallic aluminum from skimmings. Two to four oz. is usually required for every 100 lb. of metal.

United States Imports of Pig Iron by Countries of Shipment

	(In Gross Tons)			
	September		Nine Months Ended September	
	1931	1930	1931	1930
United Kingdom.....	.....	1,589	2,306	8,739
British India.....	4,814	7,848	55,394	68,345
Germany.....	.....	.....	52	50
Netherlands.....	113	229	6,358	5,941
Canada.....	.....	96	1,231	488
France.....	.....	.....	25	.....
Belgium.....	.....	515	300	615
Norway.....	53	174	2,834
Sweden.....	74	3,401	2,607
All others.....	103	956	768
Total.....	5,104	10,330	70,197	90,387

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